TECHNOLOGY DEPARTMENT

ROADS AND STREETS

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NOVEMBER 1947

Lorain Model TL-20 power shovel owned by Bayfield County Highway Dept., Washburn, Wisc.

IN GOES ANOTHER DIPPER-FULL

AS THE NEW THEW-LORAIN TL-20 SINKS ITS TEETH IN THE JOB!

The new Thew-Lorain TL-20 shovel and crane embodies many radically new operating features, but it also includes some old timers whose efficiency and dependability have been proved through many years of power shovel development and service — among them Timken Tapered Roller Bearings.

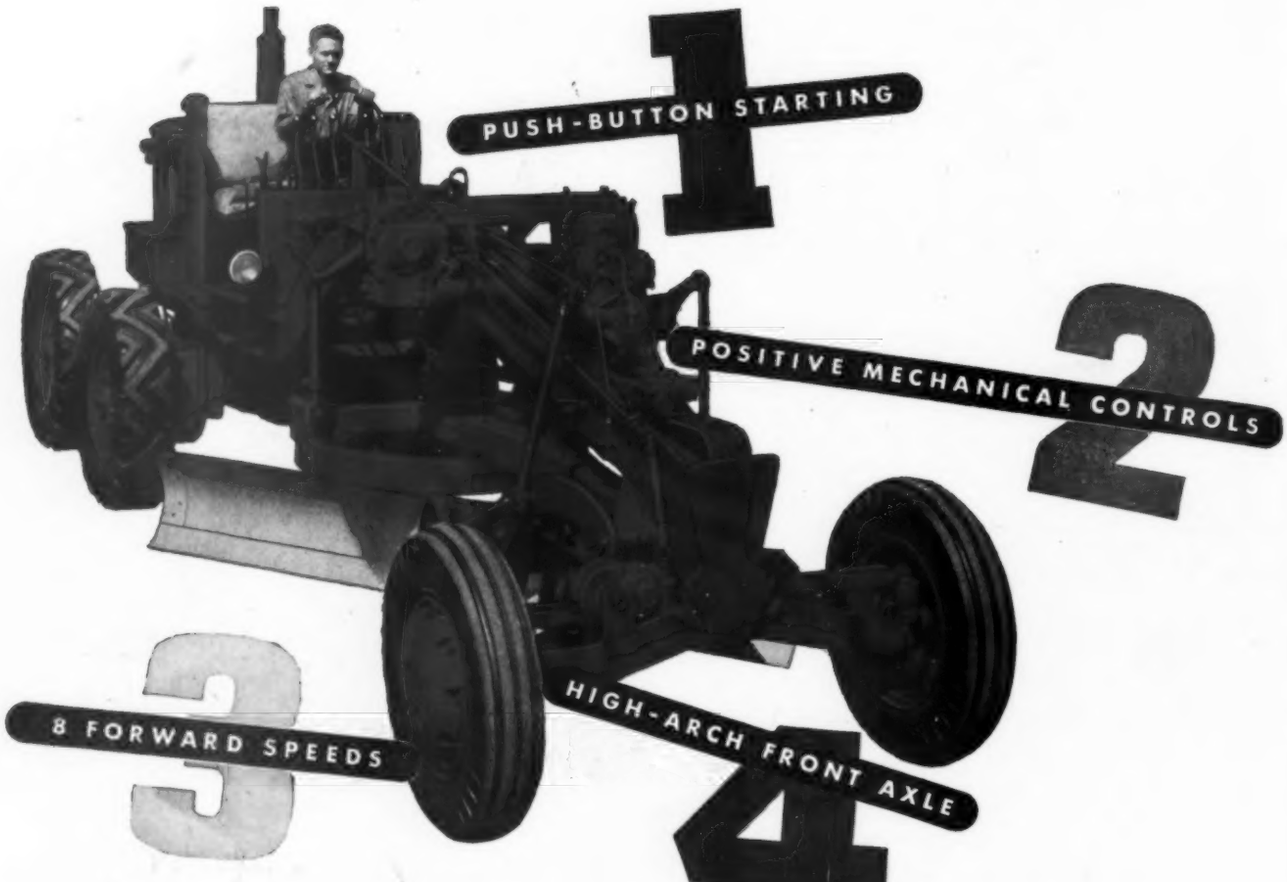
For instance, on the clutch shaft, which is the heart of the whole machine, you will find 12 Timken Bearings. These serve as mountings for the 5 clutches which control all basic operations of the machine and for the tagline and power dipper trip devices. In addition to the crawler mounting, the TL-20 may be mounted on rubber-tire Moto-Cranes in which case the list of Timken Bearings is increased further through their use in parts of other manufacturers such as Timken Detroit Axles and Transfer Cases and Ross Steering Gear.

Wherever the threats of friction; wear; radial, thrust and combined loads; and misalignment must be warded off, Timken Roller Bearings can be depended upon for complete protection.

In providing this protection they also assure low operating, lubrication and maintenance costs, thus contributing heavily to more profitable contracts. If the machine you buy is Timken Bearing Equipped you can be sure it is a quality product through and through. Look for the trade-mark "TIMKEN" on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION ✳



Only Adams Offers These 4 Big Features

Only in an Adams Motor Grader will you find *all four* of these important operating features—every one of which is essential to the kind of fast, efficient, economical performance you have every right to expect in the motor grader you buy:

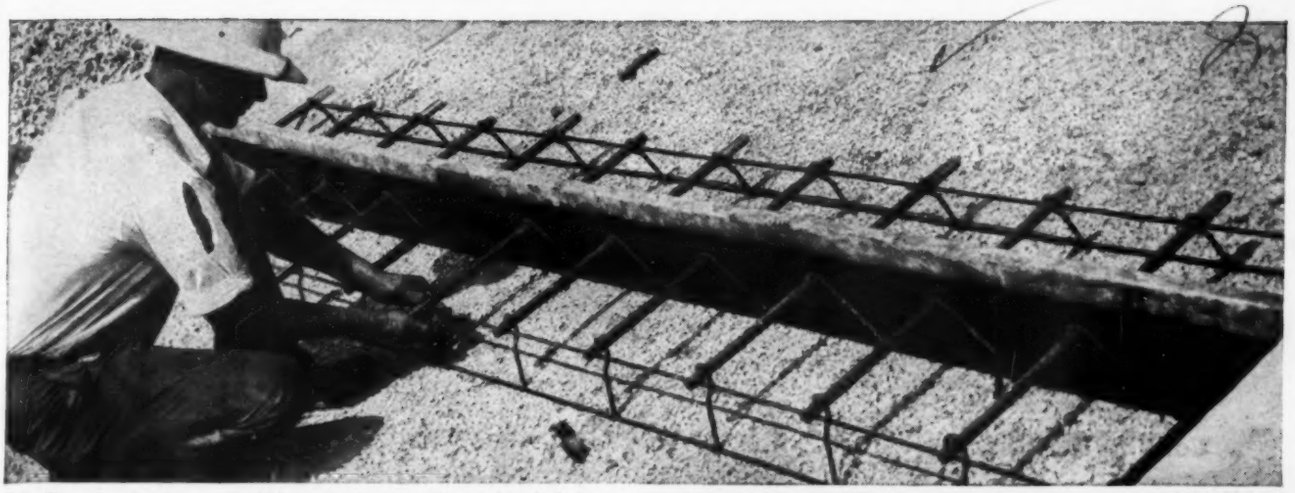
1. **Push-Button Starting** starts big Diesel engines quickly, easily—even in the coldest weather.
2. **Positive Mechanical Controls** — Adams highly accurate and dependable mechanical control system operates all controls at constant, uniform speed—even when two or more adjustments are being made simultaneously.
3. **8 Overlapping Forward Speeds** provide exactly the right speed for every grading operation—plus high transport speeds for fast travel from job to job.
4. **High-Arch Front Axle**—A distinctive feature that enables Adams Motor Graders to straddle and move big windrows of earth and oil mix—without bulldozing material with axle—without waste of power or loss of speed.

These are only a few of the many major advantages that make Adams your best motor grader buy. See your local Adams dealer for complete information.

J. D. ADAMS MANUFACTURING CO. • INDIANAPOLIS, INDIANA

Adams

MOTOR GRADERS • LEANING WHEEL GRADERS • ELEVATING GRADERS



Installing dowel tubes on Bethlehem Road Joint. These tubes, locked into place on free ends of dowels, provide positive clearance for dowel movement when expansion of the concrete takes place.

New Road Joint

HELPS SOLVE LOAD-TRANSFER PROBLEMS

Here it is—the new time-saving Bethlehem Road Joint —a lightweight bar-dowel unit that is specially designed to reduce to a minimum the load-transfer problems caused by heavy wheel loads.

Consisting of two identical units, each with sheared dowels rigidly welded to the side frame and center wire, the Bethlehem Road Joint combats load-transfer difficulties by holding the dowels in accurate alignment in both horizontal and vertical planes, at the same time permitting free movement of dowels in the concrete.

The Bethlehem Road Joint saves time for highway contractors, too, because it comes completely fabricated. Moreover, it is light enough to be handled by two men.

The joint nests conveniently, making it economical to ship by rail or truck. It lends itself to the various designs and specifications of state highway departments, and can be used either plain or with practically any type of expansion or contraction material.

For complete information about the new Bethlehem Road Joint and its applications in highways or airport runways, get in touch with the nearest Bethlehem district office. Or write us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
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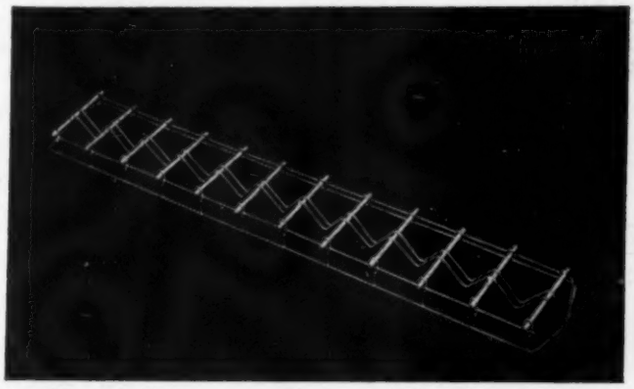
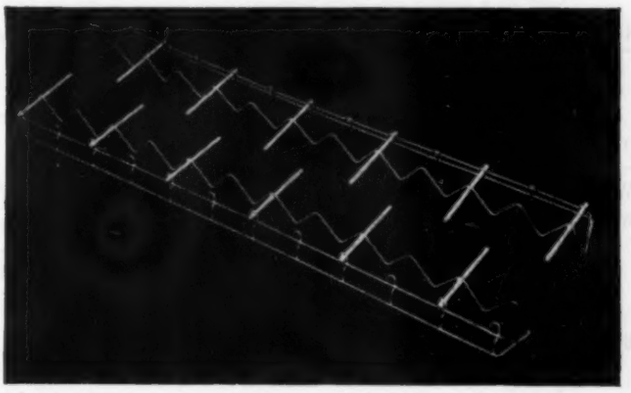
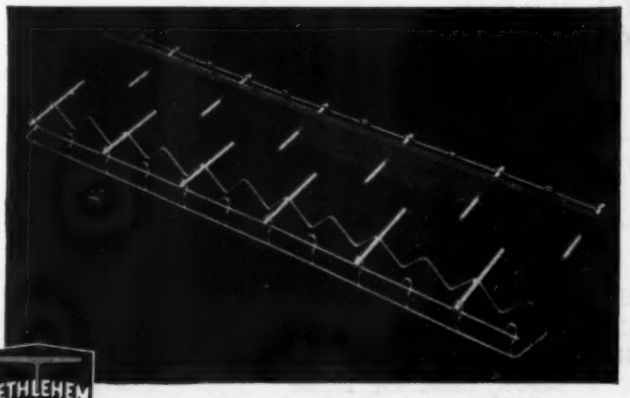


Bethlehem Road Joint comes completely assembled, ready for installation. Note how ends of dowels occupy loops in side frames.



If desired, joint can be quickly separated into these two identical sections to accommodate expansion or contraction material.



Here joint filler, mounted on dowels, is pushed back to center wire. Unit is now ready for reassembly.

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Sheet and H-Piling · **Timber Bridge Hardware**

BETHLEHEM STEEL

ROADS AND STREETS

NOVEMBER, 1947 • VOL. 90 • No. 11

With Roads and Streets Have Been Combined Good Roads Magazine And Engineering & Contracting

Coming Articles

GRADING

"Sand Drains" Get Another Large Scale Workout in California.

Wide and growing interest in vertical sand pile, as means of hastening settlement of marshy ground under fill load, lends special interest to this project report. Road: Bayshore Freeway, near San Francisco, Contractor: Macco-Morrison-Knudsen.

MUNICIPAL

Chicago's "Sea" Wall

Features of heavy stone revetment program along Chicago's lakeshore, described by an authority who had responsible part in work. Also: Dust palliative methods at Birmingham, Alabama. . . . Leaf suction machines; two improvised examples . . . how precast catchbasins save time and money in Louisville.

ROADWAY MAINTENANCE

How Kentucky forces mechanized shoulder trimming . . . Pennsylvania mudjacking practice . . . other articles coming along.

PAVING

Widening 1¼ Mile of Concrete Daily with Streamlined Outfit.

This well-known Texas contractor, Austin Road Co., also achieved perfect "no accident" record in completing 60 miles of widening strip along Texas' busiest interstate highway.

67-Mile Blacktopping Contract

Five contract sections radiating three ways out of Tallahassee, Fla. How would you plan paving operation? Plant set-ups? Read how Smith Engineering and Construction Co. handled it.

Twin 34-E Outfit Speeds Upstate N. Y. Job

Experimental use of four types of cement also feature of this concrete paving job.

BRIDGES

Tacoma Narrows span to be rebuilt. . . . How to strengthen small bridges with steel grid or added floor beams. . . . Wisconsin contractor makes simple job of deck-girder cantilever structure.

HAROLD J. McKEEVER, Editor
C. T. MURRAY, Managing Editor
H. K. GILDSEN, Contributing Editor
V. J. BROWN, Consulting Editor

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A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

Gillette Publishing Company
Publication and Editorial Offices,
22 West Maple Street, Chicago 10, Ill.

HALBERT P. GILLETTE, President; EDWARD S. GILLETTE, Publisher; H. J. CONWAY, Advertising Manager; Chicago Office: E. C. KELLY, E. H. HICKEY; New York Office: J. M. ANGELL, Manager, 155 E. 44th Street; Cleveland Office: LEE B. McMAHON, Manager, Leader Building; Los Angeles: DON HARWAY, West Coast Representative, 1709 W. 8th Street.

Acceptance under the Act of June 5, 1934, authorized Jan. 25, 1938, at Chicago, Ill. Published monthly. Subscription price $5.00 per year.

.... and get the advantages of both in the DUAL CONTROL TL-20

• That's right, dual control—a new, practical TL-20 feature that "lets you have your cake and eat it, too" insofar as mobility is concerned. Here's a two engine unit offering the "get up and go" mobility of the Moto-Crane between jobs and, which on the job, becomes a Self-Propelled unit operated and air steered from the turntable cab and powered for on-the-job mobility by the turntable engine.

Conversion from Moto-Crane to Self-Propelled unit represents a simple 5 minute operation. The TL-20 Moto-Crane, with Dual Control, is available as a 4-wheel unit with front wheel drive or a 6-wheel unit with or without front wheel drive.

TO-THE-JOB MOBILITY The TL-20's rubber-tire Moto-Crane mounting has 8 speeds forward, ranging from 1 to 33 M.P.H., and 2 reverse speeds. There's high speed travel for the highway plus a low speed range and "soft ground flotation" to master rugged off-the-road travel. Neither distance or terrain is a problem to the fast-stepping, sure-footed Moto-Crane.

ON-THE-JOB MOBILITY Conversion to a Self-Propelled unit saves time on the short moves about the job. Once the changeover is completed, the operator merely starts the turntable engine and goes to work. On-the-job travel is powered by the turntable engine at 1 to 8 M.P.H. in either direction. Steering is by air power with all steering and brake controls located conveniently at the operator's position in the turntable cab.

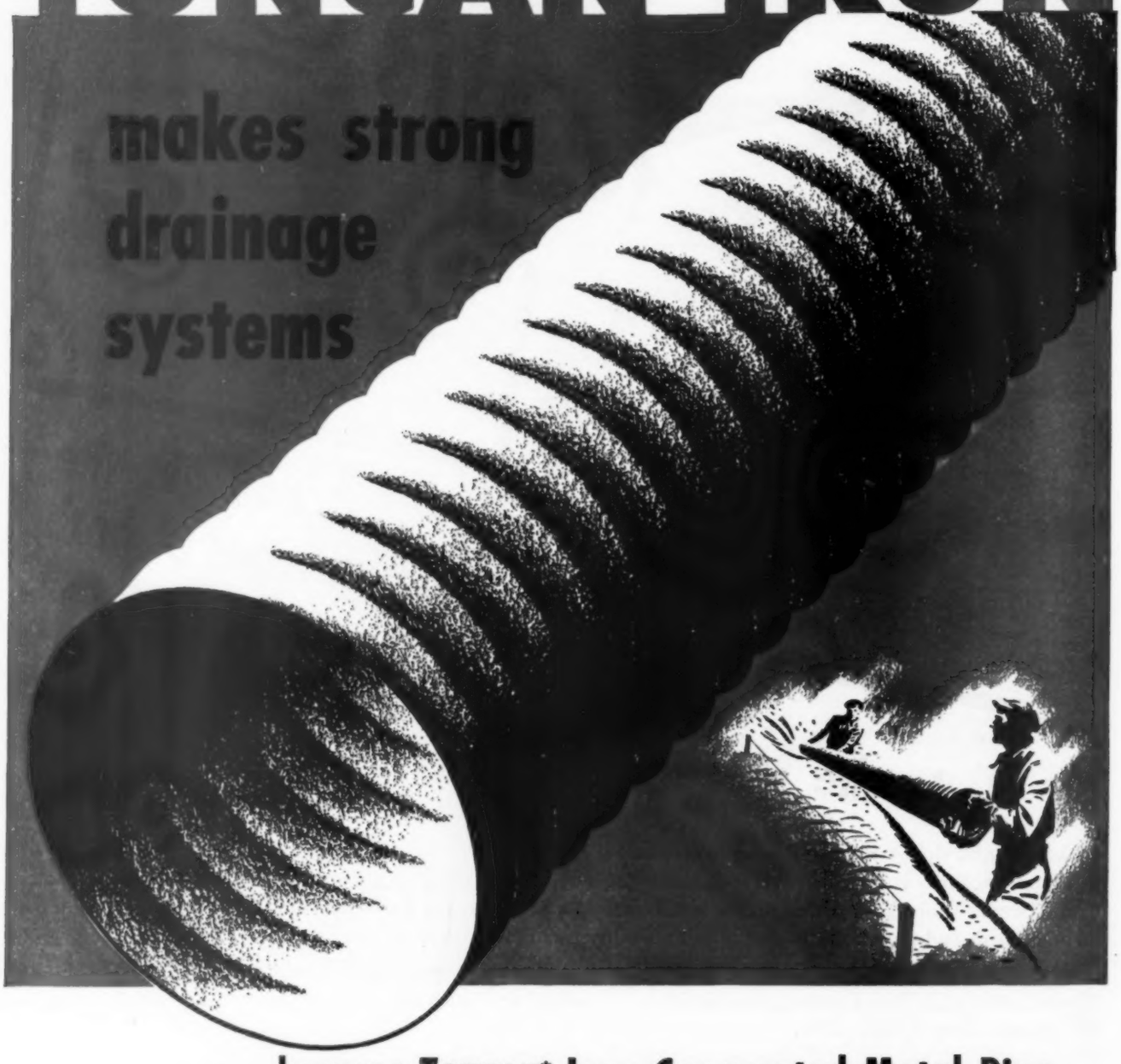
Complete data on the Dual Control TL-20 can be obtained from your local Thew-Lorain distributor.

thew-Lorain®

THE THEW SHOVEL CO.
Lorain, Ohio

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

TONCAN IRON



. . . because *TONCAN** Iron Corrugated Metal Pipe . . .

1. Has the strength to carry heavy loads—plus resiliency to prevent cracking or crumbling.
2. Is not damaged by vibration, impact, severe weather changes, earth settlement, etc.
3. Is securely riveted with Toncan Iron rivets for long life.
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SECTIONAL PLATE PIPE • SECTIONAL PLATE ARCHES • SECTIONAL PLATE PIPE-ARCH • BITUMINOUS COATED AND PAVED PIPE

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Still the Standard toward which others build!

If you have a REAL ROCK SHOVEL you won't have to worry about output in dirt

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FOR GREATER DIGGING POWER
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Year in, year out, for over 20 years one or more Northwests out of every three has been a repeat order in the hands of a responsible contractor *making money*.

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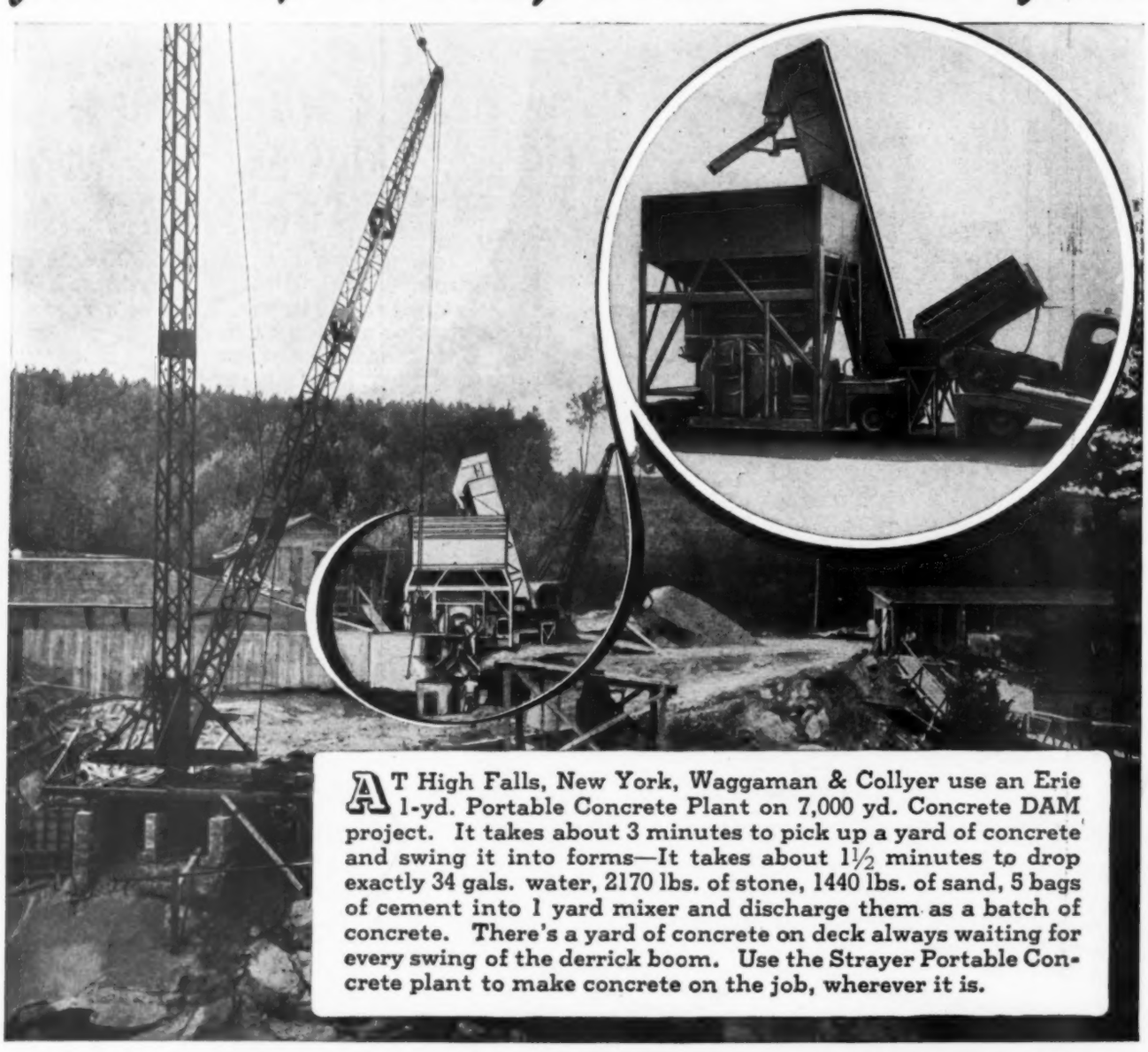

AT High Falls, New York, Waggaman & Collyer use an Erie 1-yd. Portable Concrete Plant on 7,000 yd. Concrete DAM project. It takes about 3 minutes to pick up a yard of concrete and swing it into forms—It takes about 1½ minutes to drop exactly 34 gals. water, 2170 lbs. of stone, 1440 lbs. of sand, 5 bags of cement into 1 yard mixer and discharge them as a batch of concrete. There's a yard of concrete on deck always waiting for every swing of the derrick boom. Use the Strayer Portable Concrete plant to make concrete on the job, wherever it is.

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IN ADDITION TO OUR 1½ to 2 H.P. ENGINES

4 CYCLE
The Precision Built
THE CLINTON
AIR COOLED ENGINE
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You'll welcome this finer quality engine—its DURABILITY—its ABILITY to stay on the job—its attractive PRICE are certain to give it a place in the heart of users, dealers and manufacturers employing compact air cooled power. After you've tested it on your own equipment, you will realize it's a winner.

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Here's a new machine and that will *MAKE MONEY*

Digs... hauls... spreads

Rig is self-loading . . . picks up 3.3 yards at a clip . . . hauls at high speed . . . spreads in smooth easily-compacted layers . . . ideal for working roadside gravel pits.

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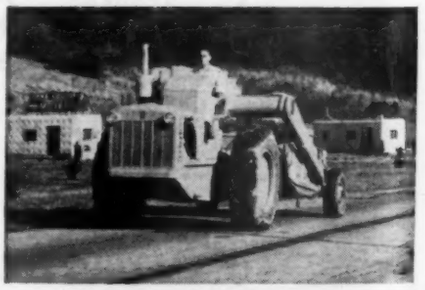

Fast job-to-job moves

Travels over pavement or cross country at speeds up to 23 m.p.h. No waiting for trailer. Just hop on and go . . . move your dirt . . . move on to next job.

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See your LeTOURNEAU Distributor now for complete facts on this ONE-MAN DIRTMOVER

a new business FOR YOU!

HERE'S your chance to build a profitable "one-man business" — simply by cashing in on the ready-made demand for small contract dirtmoving.

A new type of business

You'll also be getting in on the "ground floor" because, until recently, there has never been an economical way to handle small, scattered dirtmoving jobs. Today, however, with the new high-speed "D" Tournapull, a self-powered, rubber-tired Scraper, one man can handle a number of small jobs per week . . . collect a good price for each job . . . develop an attractive business or side-line with a really promising future. Best of all, this versatile new tool eliminates the need for power shovel, trucks, flatbed trailer, drivers and operator formerly necessary to mechanize small dirtmoving operations.

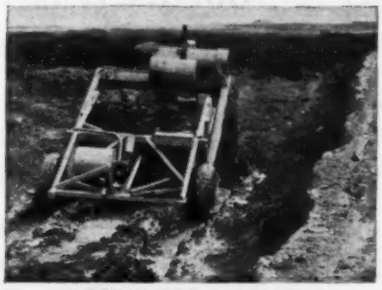
$12,000 gets you started

You can get a new 3-yard "D" Tournapull delivered to your door for less than $12,000 complete. Less than $25 per day pays your operating cost for this one-man dirtmover, leaving you plenty of room for profit.

Be first in your locality to offer this profitable new service. See your LeTourneau Distributor today for a FREE DEMONSTRATION.

Handles multiple jobs

High speed lets you handle a number of small jobs per week. Your only competition is a pick and shovel gang or power shovel with a couple of trucks.



All-weather tool

Goes anywhere, anytime. Not afraid of mud, snow or ice. Positive power steer, plus revolutionary new type differential take it through where trucks would stall.

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Counties

$ Cleaning drainage ditches . . . dressing shoulders and berms . . . building fire lanes and short feeder roads . . . graveling secondary roads.

Cities and Towns

$ Grading streets for new subdivisions . . . landscaping around parks, golf courses and cemeteries . . . grading airport runways . . . covering garbage dumps . . . snow removal.

Builders

$ Leveling and filling lots . . . digging group basements . . . grading and graveling driveways . . . spreading top soil . . . developing subdivisions.

Industries

$ Stockpiling coal and bulk materials . . . grading for short spur tracks, leveling building sites . . . disposing of slag, cinders, other waste.

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$ Stripping overburden . . . graveling haul roads . . . delivering or reselling gravel, crushed stone or agstone loaded from stockpiles.

Railroads

$ Grading right-of-way . . . cutting down banks . . . "day-lighting" curves . . . spreading ballast . . . grading for industrial sidings.

Mining Black Dirt

$ Ideal for fill-in work. Can mine at convenient locations to service city and farm buyers.

LETOURNEAU PEORIA, ILLINOIS HIGH-SPEED UTILITY TOURNAPULLS

This hot-ladle crane cost more than $100,000 . . . but as it is it couldn't work!

You don't use this sort of equipment in construction, but it affords a splendid example of where false economy might be extremely costly.

This gigantic, 100-ton, ladle crane cost well over $100,000—but it couldn't pour a drop of molten metal without wire rope. That's what's missing in this picture. How much does wire rope cost? Ordinary wire rope—about $1500. The superior wire rope—Preformed Improved Plow Steel—about $1800.

Be safe. Be sure. Don't let penny wisdom keep you from having the best. Specify Preformed of Improved Plow Steel for your next rope. And when you buy a machine—any machine—make certain it is equipped with Preformed. You will like it because it lasts longer. Your workmen will like it because it is easier and safer to handle.

PREFORMED WIRE ROPE

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Address: Preformed Wire Rope Information Bureau,
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ASK YOUR OWN WIRE ROPE MANUFACTURER OR DISTRIBUTOR

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AIR PLUS JAEGER COMPRESSOR

get your air costs

down to today's

Jaeger figures

Here's why Jaeger air COSTS LESS . . .

75% to 100% larger "Tough Swedish Twin" valves, ultra-lapped to leakproof closure — 20% to 30% slower, cooler piston speed — 100% efficient intercooling — force feed lubrication—balanced, precision parts —mean smoother, vibrationless performance, free air flow without the usual heat, carbon and power-wasting back pressure — more air from every pound and dollar of fuel and much lower cost of upkeep with compressor units that outlast their original engines* 3-to-1.

(*Caterpillar, Continental and International powered.)

Your Jaeger distributor is today supply headquarters for contractors in your locality who are applying modern *low-cost* air power to their work. He handles the finest air tools, engines and compressors on the market — he knows air — he is an important link in a chain of 128 Jaeger air stations across the U. S. and Canada which give on-the-spot service to contractors wherever their jobs may be.

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THE JAEGER MACHINE COMPANY, Columbus 16, Ohio

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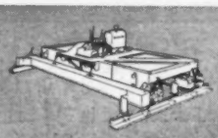


JAEGER Spreaders, Finishers

"SPEEDLINE" Concrete Mixers

"SURE PRIME" Contractors Pumps

JAEGER *Engineered* **EQUIPMENT**

"DUAL-MIX" TRUCK MIXERS, AGITATORS — HOISTING ENGINES, SELF-RAISING TOWERS — CONCRETE AND BITUMINOUS PAVING EQUIPMENT

MAINTAINING

2100 TOUGH MILES OF ROAD

Dust, mud, rock, snow and mountains make things tough for the highway department that has to deal with the construction and maintenance problems of Klamath County's 2100 miles of dirt, gravel and hard-surface roads.

Yet three "Caterpillar" Diesel Motor Graders and three "Caterpillar" Diesel Tractors can take everything such problems can throw at them. Says Ed Propst, road superintendent for this huge Oregon county:

"We've got tough construction and maintenance problems. But there isn't one of our jobs that our 'Caterpillar' equipment can't handle better, quicker, cheaper. These machines last a long time, too."

Yes, today most any county or region can have good roads with a comparatively small investment in "Caterpillar" equipment and at remarkably low average cost-per-mile. For these powerful, versatile machines are specialized for the job. They can do an amazing amount of work per day. Their fuel and upkeep costs are almost unbelievably low.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

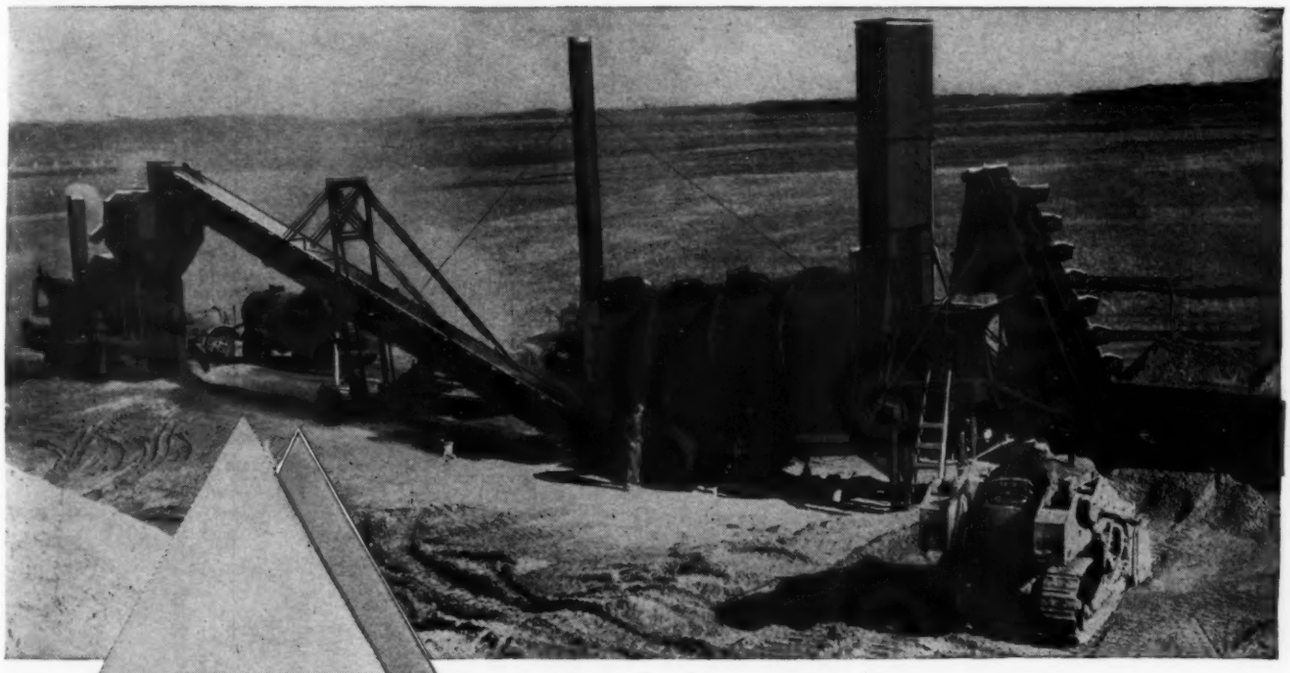
CATERPILLAR

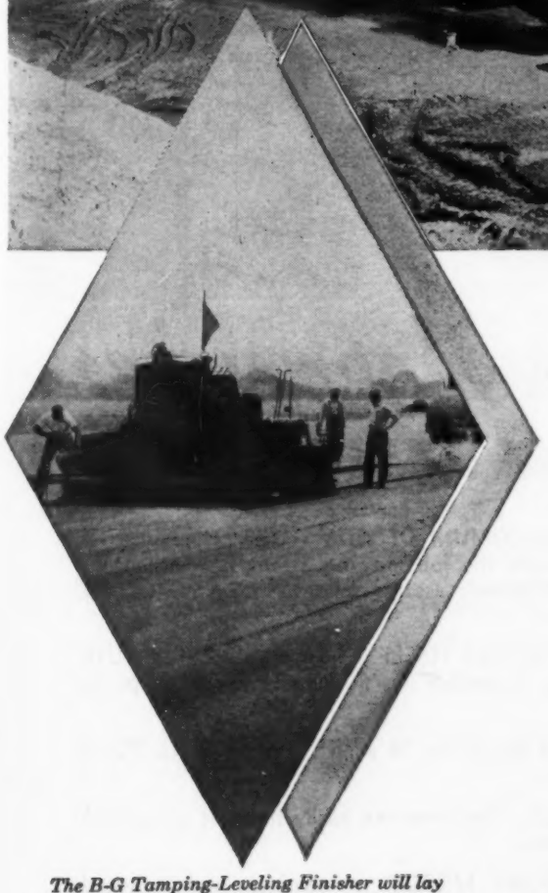
REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

• One of Klamath County's "Caterpillar" Diesel Motor Graders shaping up a ¾-mile stretch of dirt-and-cinder road in 3½ hours.

Barber-Greene





The B-G Tamping-Leveling Finisher will lay any mix, hot or cold. Places a continuous ridge-free surface with each succeeding strip firmly compacted against the previous one.

High-Capacity

"Intermediate" Mixing with Portability

Here's the B-G "Intermediate" Bituminous Mixing Plant that combines the convenience of true portability with the basic advantages of the B-G Bituminous Mixing System*. You can tow the units you need to the job, right to the spot that's most convenient and economical from the standpoint of aggregate source and need for finished mix.

In its accuracy the B-G "Intermediate" Plant bridges the gap between the B-G "High-type" and B-G Travel Plant. Capacity is from 80 to 120 tons per hour. It is used principally for single-aggregate mixes; however, an optional 2-compartment charging Bin, with B-G 2-gate Reciprocating Feeder, provides a method of feeding a fine and coarse aggregate where rigid aggregate gradation is not required. For details, write for literature, or see your B-G representative.

***THE B-G BITUMINOUS MIXING METHOD:** Continuous flow, with measured volumetric aggregate content, metered bitumen supply, controlled temperature, and thorough twin-pugmill mixing —through flexible, coordinated portable units. Barber-Greene Company, Aurora, Illinois.

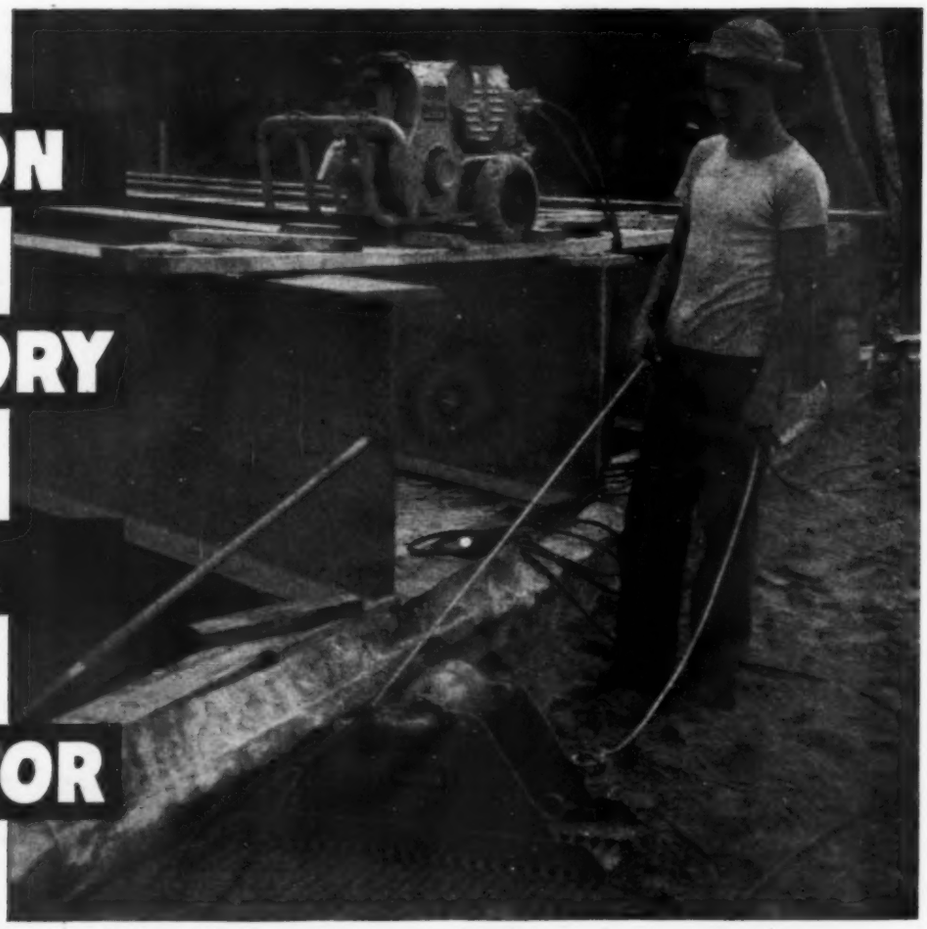
BARBER-GREENE COMPANY · AURORA, ILLINOIS

Constant Flow Equipment

LOADERS · PERMANENT CONVEYORS · PORTABLE CONVEYORS · COAL MACHINES · BITUMINOUS PLANTS · FINISHERS · DITCHERS

The

JACKSON VIBRATORY SOIL COMPACTOR



"Pre-Settles" Bridge Approaches

ETC., QUICKLY • INEXPENSIVELY!

This remarkable new machine will give you up to 95% of MAXIMUM DENSITY (in granular soils) IN A SINGLE PASS — and do it in less than one-fifth of the time the job may be attempted with other equipment! Eliminates long delays in paving and paving settlement; assures solid sub-base for factory concrete floors on which heavy machinery is to be mounted.

Note these features: 1. PROPELS ITSELF AT 6' to 8' PER MINUTE . . . under normal conditions. Operator has nothing to lift or drop; he simply guides it.

2. FIRMLY COMPACTS 15 sq. ft. to 18 sq. ft. PER MINUTE TO A DEPTH OF 12 INCHES!

3. WEIGHS ONLY 150 LBS. Two men can easily throw it on a truck or carry it to nearby locations.

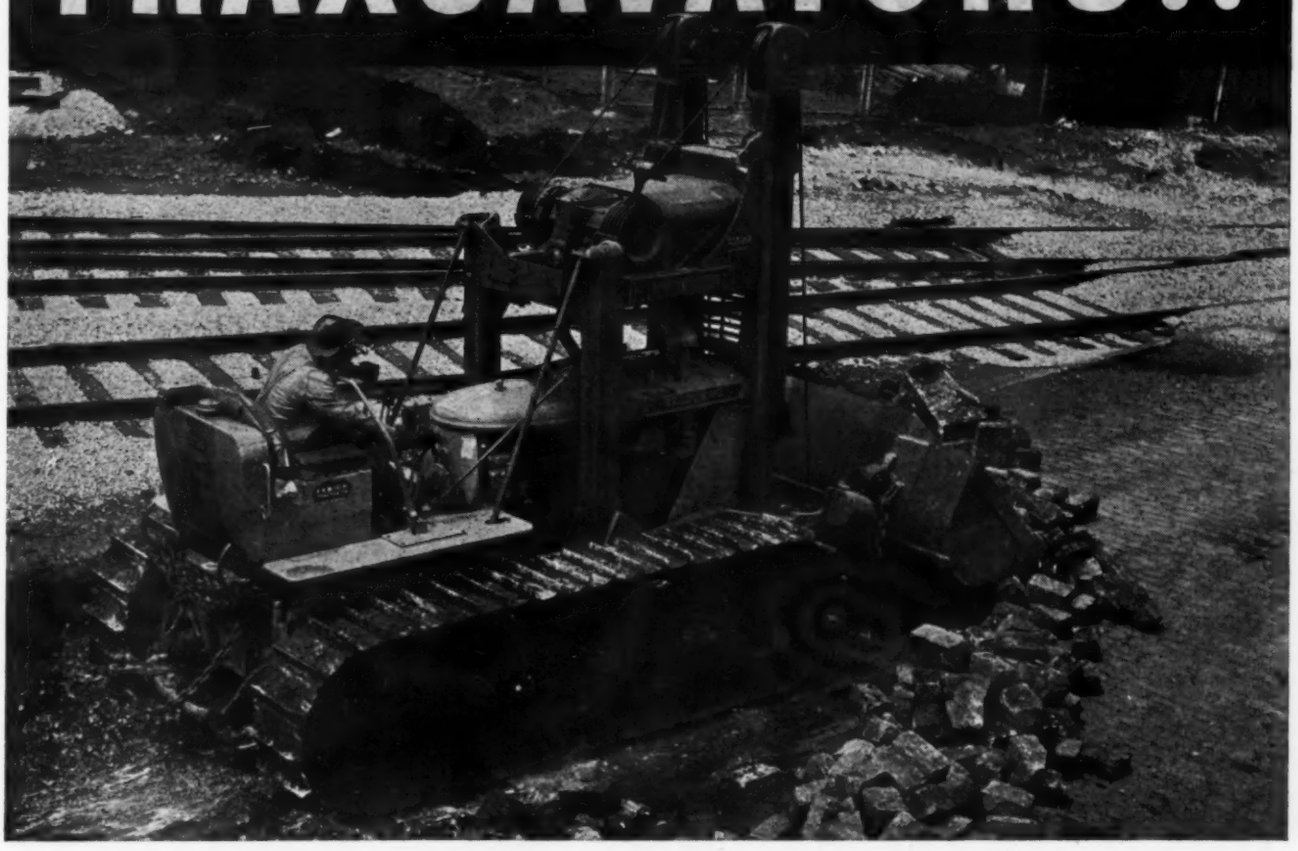
4. TIME-TESTED VIBRATORY MOTOR — used on our standard equipment for 25 years. Operates on 3-phase, 110 volt, 60 cycle AC.

It's the ideal soil compactor for those areas inaccessible to the large, tractor drawn equipment. With a change of bases, it is also highly effective on coarse gravel and rock, and for smoothing and compacting blacktop. What "pre-shrinking" is to the cotton shirt, vibrating with the Jackson Compactor is to bridge approaches and similar fills. Write, NOW, for the complete facts!

THE MODEL M-2 PORTABLE POWER PLANT (see photo) usually furnished to operate Jackson Soil Compactors generates both single-phase and 3-phase 110 volt, 60 cycle AC. May be used for lights and power tools as well as running the Compactors. Will operate 4 Compactors simultaneously. JACKSON Power Plants are known throughout the nation for their outstanding reliability.

ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Mich.

TRAXCAVATORS..



HAVE GOT WHAT IT TAKES!

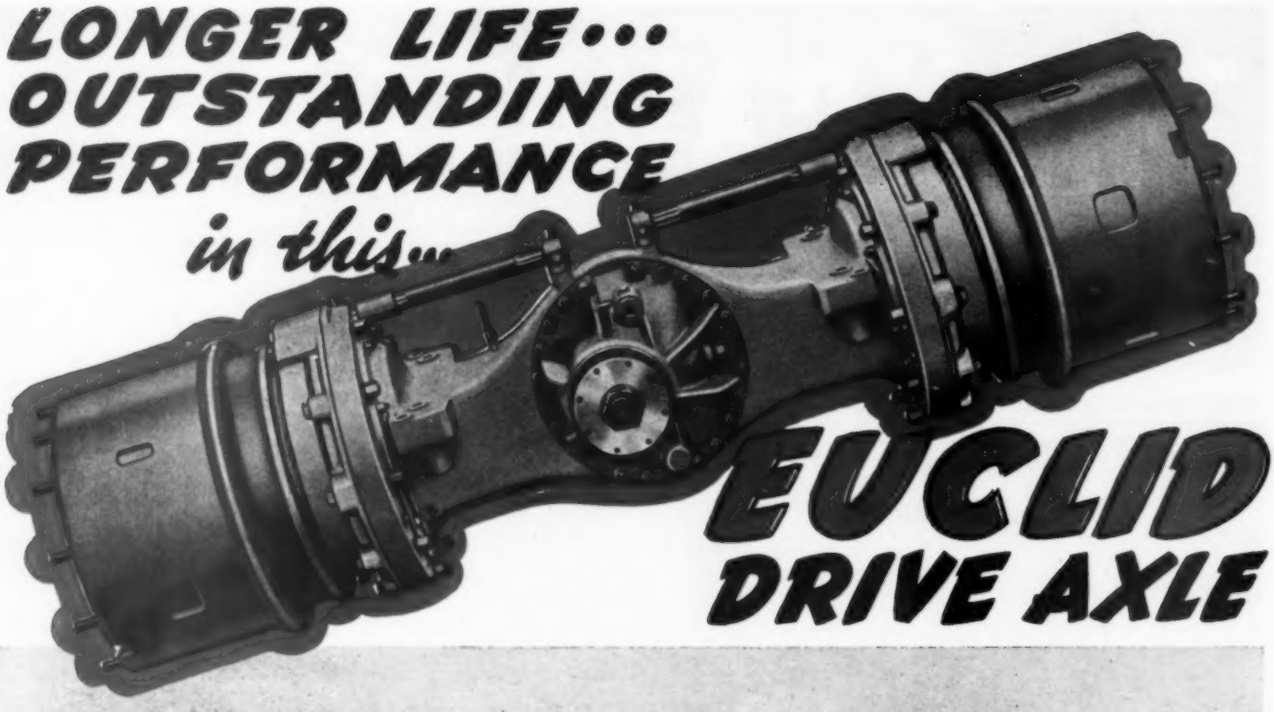
Tearing up old stone or brick paving, without any initial preparation is tough, heavy work — but not too tough for TRAXCAVATORS. These big, rugged machines take it and other equally-hard jobs in their stride — as though they were built for it . . . and they are!

TRAXCAVATORS are powerful tractor-excavators mounted on "Caterpillar" track-type tractors. They are the most versatile machines of their type in the world . . . do more jobs at lower cost than any other equipment of comparable size, power and capacity.

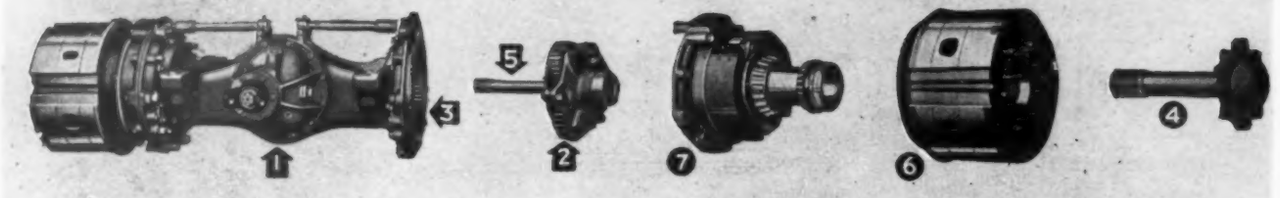
Put them to work tearing up old pavement, grading, leveling new or old streets, removing snow, loading stone, sand, rock or other material and watch production figures go up and costs come down. User reports from everywhere prove their year-round usefulness and economy.

TRAXCAVATORS are available in four sizes with bucket capacities ranging from ½ to 4 cubic yards — a size for every job and purpose. See your nearest TRACKSON-"Caterpillar" dealer for facts on how TRAXCAVATORS can help you — or write direct to TRACKSON COMPANY, Dept. RS-117, Milwaukee 1, Wis.

LONGER LIFE... OUTSTANDING PERFORMANCE in this...



EUCLID DRIVE AXLE



THIS double reduction planetary drive axle transmits tremendous pulling power with relatively little burden on the intermediate driving parts — transmission, differential, etc.

It is full-floating — all of the rear axle load being carried on heavy duty tapered roller bearings mounted on hollow axle spindles which keep axle shafts and gears entirely free from vehicle and payload weight. All working parts of this precision built axle assembly are completely enclosed in an oil bath.

This type of drive axle has been used in both Rear-Dump and Bottom-Dump Euclids *for 14 years.* Its strength and capacity are unequalled by any other axle in heavy duty hauling equipment. The Euclid axle is a highly important factor in the longer life and outstanding performance of Euclids.

Advantages of Euclid Planetary Drive Axle

The driving parts of the Euclid axle are (a) — a primary reduction consisting of conventional spiral bevel ring gear, pinion and differential (1), (b) — secondary reduction of two floating planetary gear sets (2) each made up of a sun gear, three planetary gears and internal ring gear (3). The only parts carrying the full driving torque are the outer drive axles and hub caps (4). The inner axles (5) carry less than 1/5 of the torque delivered to the driving wheels (6) which are mounted on tapered roller bearings on the hollow spindles (7). The use of the planetary reductions makes possible minimum gear reductions in the transmission and differential and results in much lighter loads being imposed on all parts between the planetary gears and engine.

The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio

What a Haiss Snow Loader does for many cities . . . and can do for you!

- *One machine does the work of 80 men* shoveling snow by hand.
- *Pays for itself* each winter—100% return on investment annually.
- *Dependable*—available any hour, night or day, at a moment's notice.
- *Fast*—cleans up congested traffic areas in a few hours.
- *Loads* 15 yards a minute.
- *Reduces* truck rentals $200 to $300 or more per 8-hour shift.
- *Breaks up* and handles hard and frozen snow better than any other machine—due to chopping action and upward lift of cutting blades.
- *Mobility*—changes location quickly—6½ miles per hour traveling speed.

Haiss is now a wholly-owned subsidiary of Pettibone Mulliken Corporation of Chicago. With new management and much larger resources, Haiss can now do a still better job for its customers . . . better machines and servicing, larger production, quicker deliveries.

Haiss specializes in equipment to load bulk materials . . . snow, sand, gravel, stone, coal, topsoil, etc.

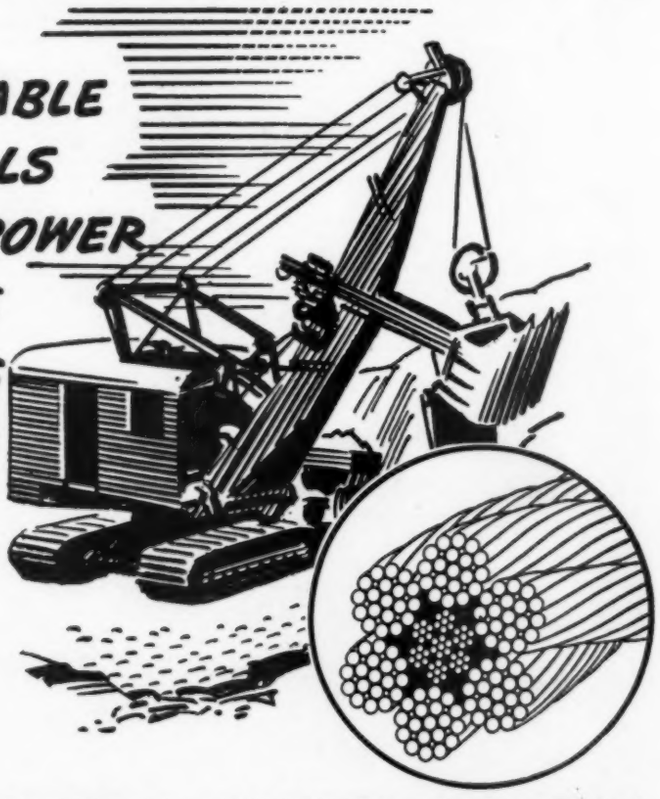
Its machines are money-makers for their owners.

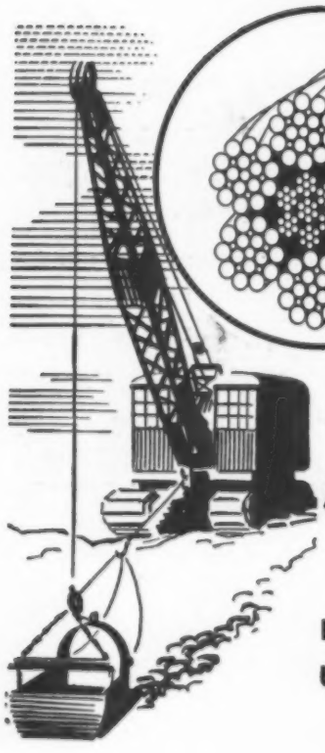
George Haiss Manufacturing Co.
381 Canal Place
New York 51, N. Y.

SOME ROPES FOOL YOU

U-W 6×19 FILLER WIRE CABLE IS IDEAL FOR BOOM FALLS AND HOIST ROPES ON POWER SHOVELS BECAUSE IT IS FLEXIBLE AND RESISTS FATIGUE AND ABRASION

BUT...





FOR DRAG CABLES ON DRAG LINE EXCAVATORS, U-W 6×16 FILLER WIRE IS BETTER BECAUSE IT IS COARSE AND RESISTS ABRASION BETTER, YET IS SUFFICIENTLY FLEXIBLE

For longest and best service, always specify U-W LAYRITE (*Preformed*) IMPROVED PLOW STEEL

We invite you to let UPSON-WALTON engineer your tough rope jobs.

Copyright 1947—The Upson-Walton Company

THE UPSON-WALTON COMPANY

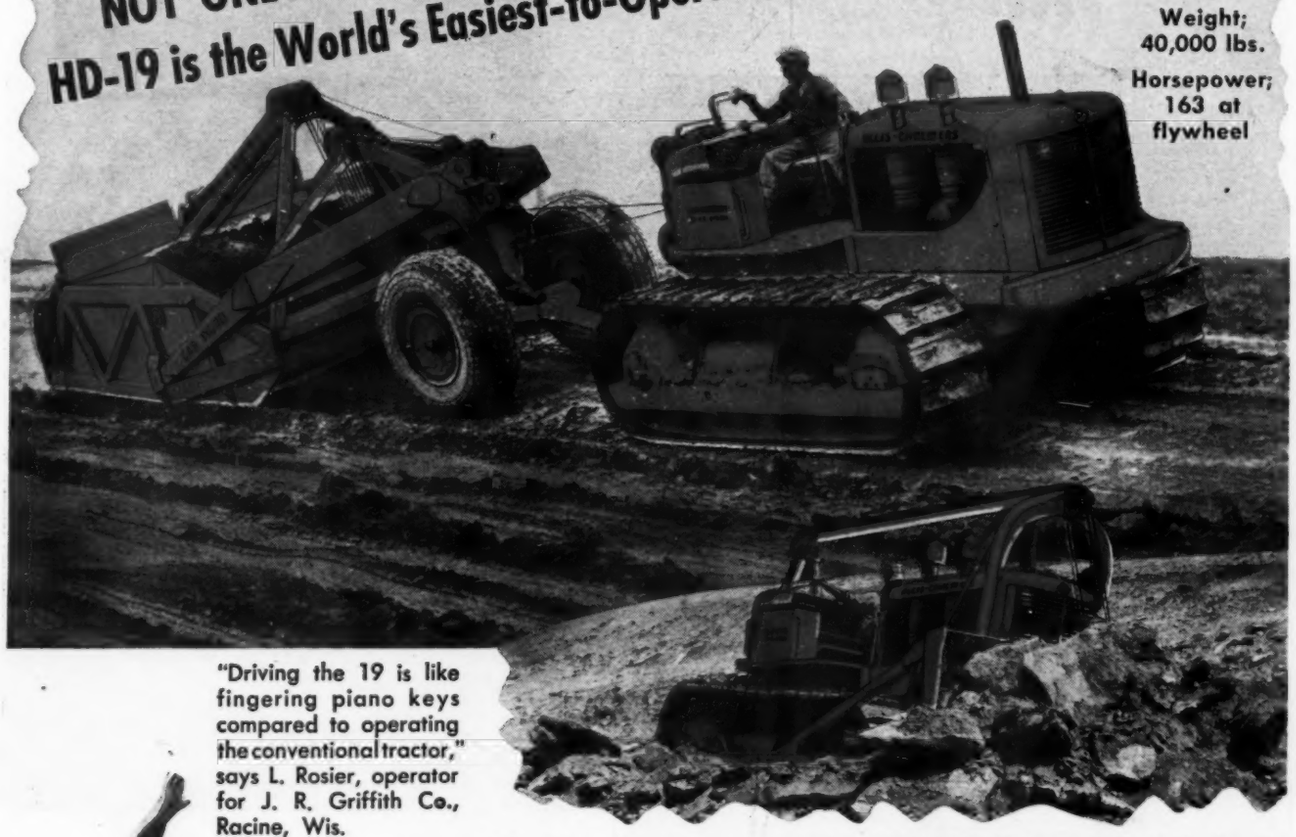
Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks, Brattice Cloth

Main Offices and Factory: Cleveland 13, Ohio

114 Broad Street, New York 4 | 737 W. Van Buren Street, Chicago 7 | 241 Oliver Building, Pittsburgh 22

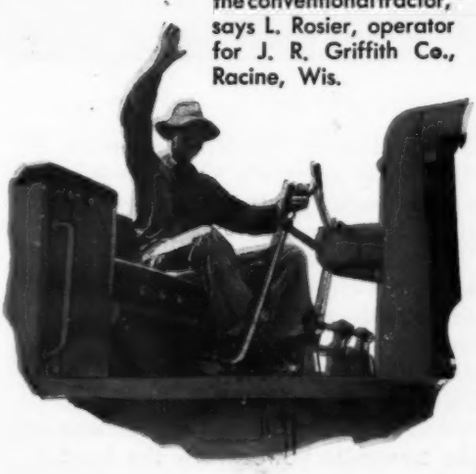
An Operator's Dream Tractor

NOT ONLY THE WORLD'S LARGEST, MOST POWERFUL...
HD-19 is the World's Easiest-to-Operate, Most Comfortable Tractor



Weight; 40,000 lbs.

Horsepower; 163 at flywheel



"Driving the 19 is like fingering piano keys compared to operating the conventional tractor," says L. Rosier, operator for J. R. Griffith Co., Racine, Wis.

Yes, it's a pleasure to operate the NEW Allis-Chalmers HD-19, hydraulic torque converter tractor. Everything possible has been done to make the operator's job easier.

Shifting is practically eliminated. There are only TWO forward gear ratios — 0 to 3.0 and 0 to 7.0 m.p.h.; ONE reverse, 0 to 5.5. Torque converter makes this possible — automatically selects the maximum speed in each of these wide speed ranges at which load can be moved.

No fighting with steering levers and brakes, either. There's hydraulic, finger-tip steering — just a slight pressure on the lever and the tractor turns immediately — and stays turned, no bouncing back. For a full turn, the slight pressure on the lever plus resting the foot on the self-energizing brake does the job — no tiresome pulling and pushing.

Other operating advantages include electric starting, a new type, adjustable split seat . . . wide arm rests . . . adjustable brake pedals . . . full visibility . . . comfortable foot rests and a clean platform.

A faster-working, more powerful tractor, more easily operated, means greater production . . . more yards moved day in and day out.

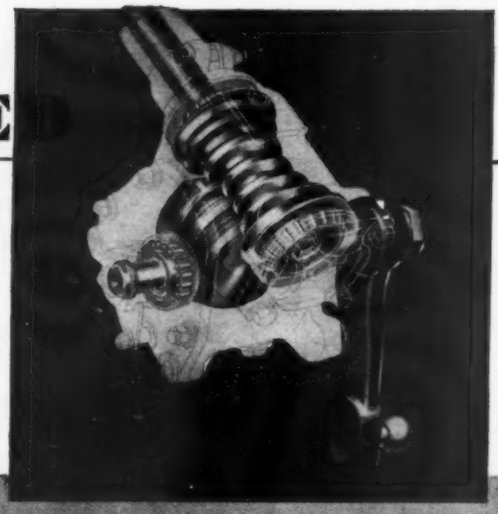
ALLIS-CHALMERS ORIGINATOR OF THE TORQUE CONVERTER TRACTOR

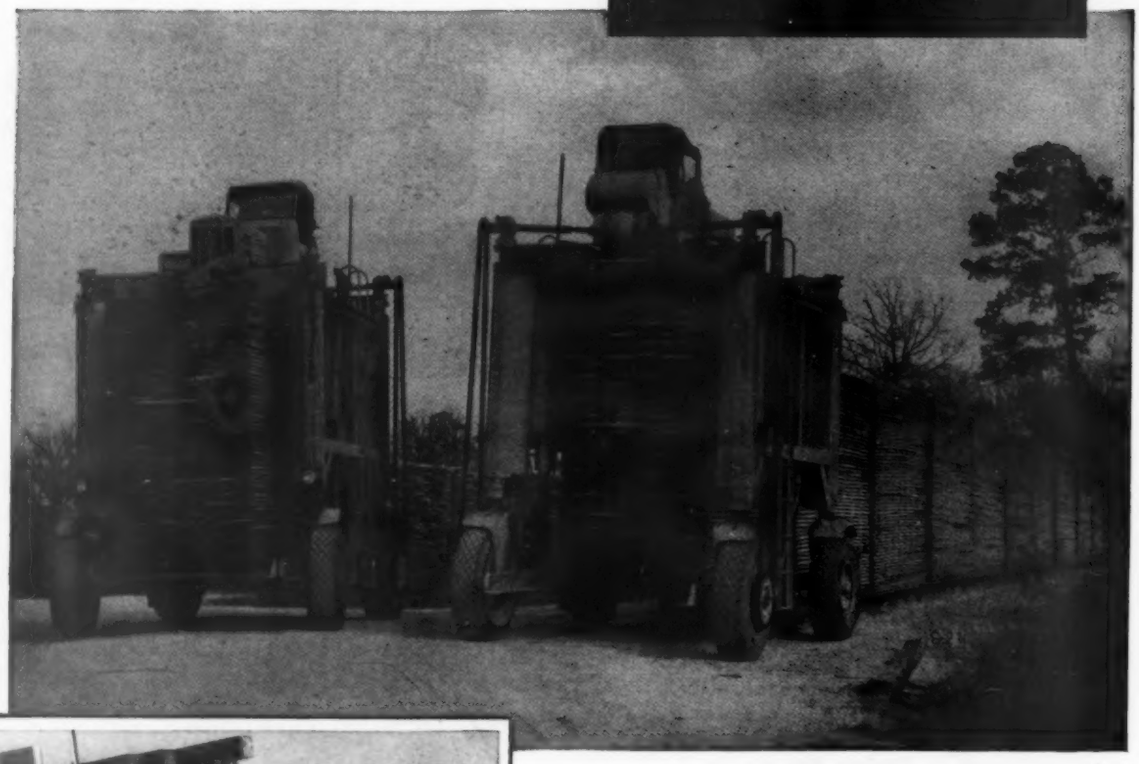
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

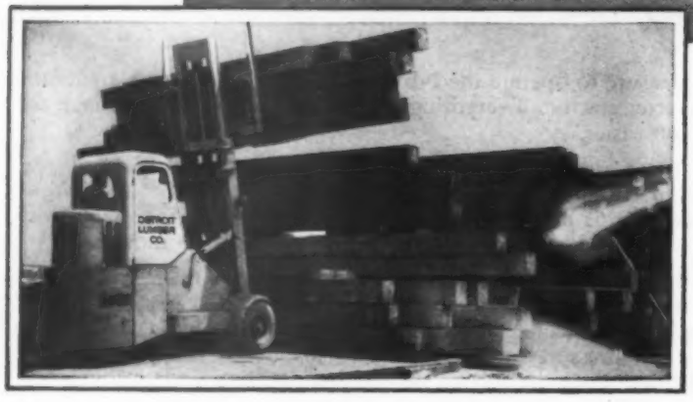
GEMMER STEERE

ROSS Straddle CARRIERS

move big loads easily







Ross Straddle Carriers, standard equipment for moving heavy loads, are widely used in handling many other products. The straddle principle is of particular value in moving heavy, bulky unit packages.

These carriers are equipped with Gemmer Easy Steering—the simplest, easiest steering available.

Compact, efficient, sturdy—Gemmer Steering brings ease of handling to all types of motor vehicles. The worm and roller tooth principle transmits power with the least possible loss.

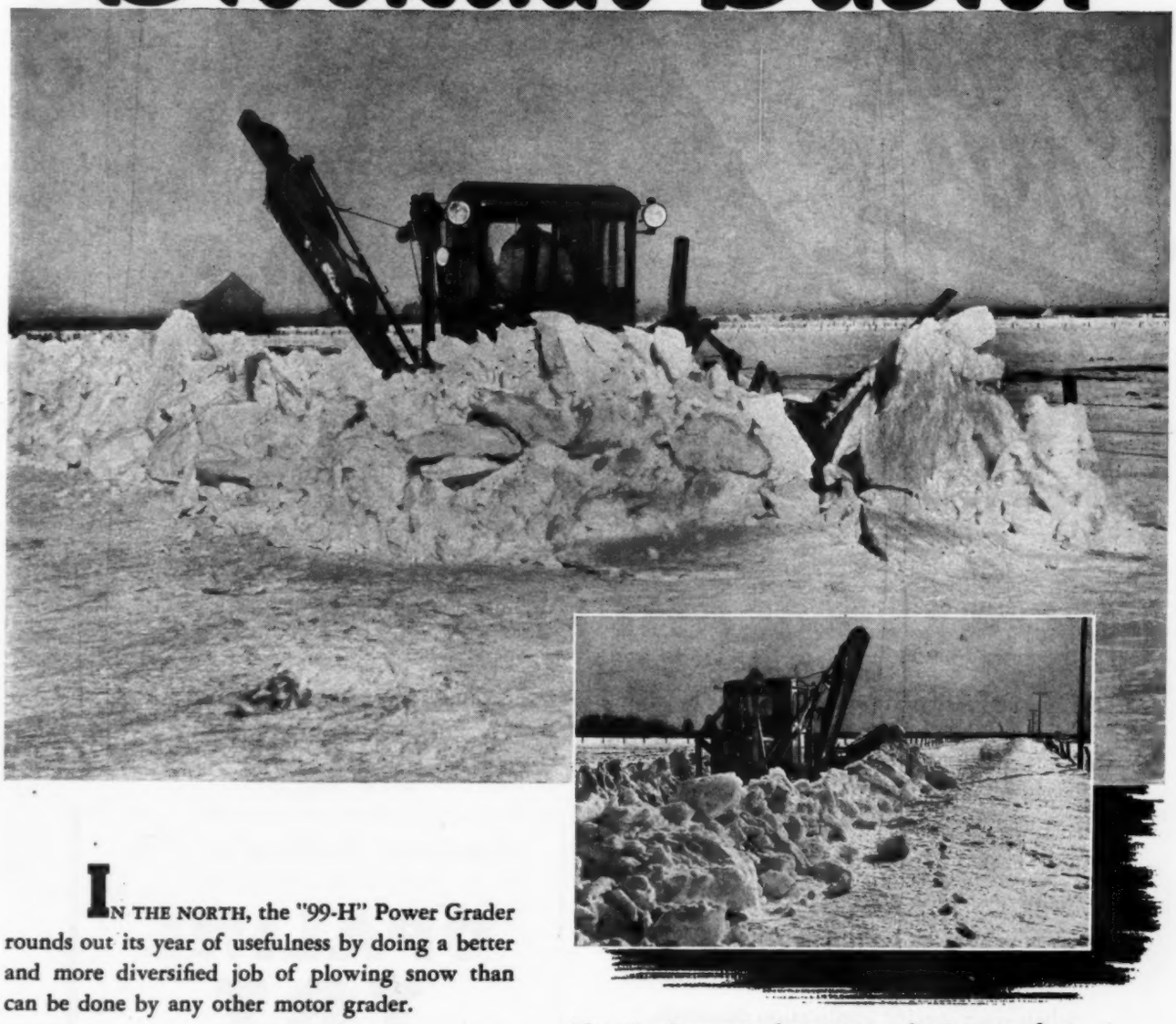
So durable it lasts the life of the vehicle with reasonable care.

GEMMER

MANUFACTURING COMPANY

6400 MT. ELLIOTT • DETROIT 11, MICHIGAN

Blockade Buster



IN THE NORTH, the "99-H" Power Grader rounds out its year of usefulness by doing a better and more diversified job of plowing snow than can be done by any other motor grader.

All-Wheel Drive provides maximum traction for the Giant "V" plow, mounted extra close to the powerful front drivers. No other motor grader is fitted with as big a plow—because no other motor grader could handle it.

All-Wheel Steer makes the "99-H" more maneuverable than any other motor grader; simplifies and speeds up the handling of a wide variety of jobs, like plowing around a corner, plowing out farm drives and working close to signs and mail boxes.

Working together, All-Wheel Drive and All-Wheel Steer resist the side thrust that is always present when widening-out and winging. Ask the operator. He will tell you "no other machine can plow snow like the '99-H'."

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U.S.A.

BUILDERS OF ROAD MACHINERY

Austin Western

SINCE 1859

Cold Facts...

...ON LUBRICANT PERFORMANCE

This special refrigerating apparatus at Sinclair Laboratories tells an important story every day to research experts and refinery control technicians.

The thermometers, shown above inserted in lubricating oil samples, record temperature as cold is increased in the special refrigerating apparatus. Trained observers check the samples frequently, test for pour point. Sinclair, thus, makes sure that its lubricants retain full protective qualities even at sub-zero temperatures . . . when your specific application demands.

Such constant manufacturing control and research assures you that famous Sinclair lubricants . . . and all new Sinclair products . . . will give outstanding performance to meet your most exacting requirements.

Sinclair Automotive Oils
For Truck, Bus, and Tractor

OPALINE TBT OIL

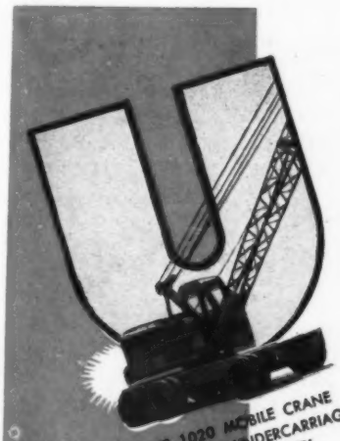
Positive lubrication — Maximum power
For the long pull, under heavy loads

SINCLAIR REFINING COMPANY • 630 FIFTH AVENUE, NEW YORK 20, N. Y.

SINCLAIR

Lubricants for Industry

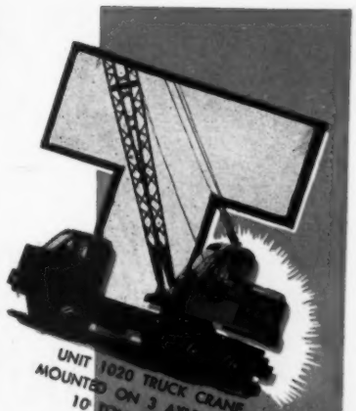
FINEST CRUDES + EXPERT RESEARCH and MANUFACTURING CONTROL = OUTSTANDING PERFORMANCE



UNIT 1020 MOBILE CRANE
WITH 3 AXLE UNDERCARRIAGE
10 TON CAPACITY

UNIT 1020 MOBILE CRANE
WITH 2 AXLE UNDERCARRIAGE
10 TON CAPACITY

UNIT 357 MOBILE CRANE
WITH 2 AXLE UNDERCARRIAGE
5 TON CAPACITY

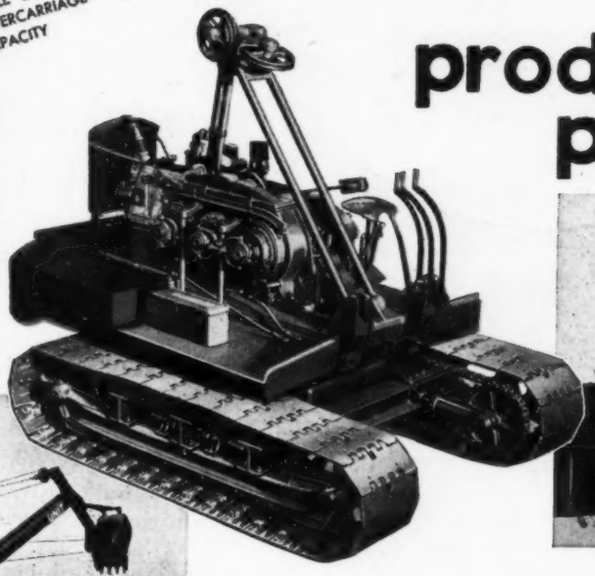


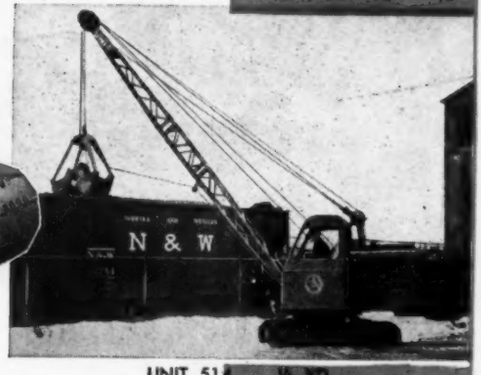
UNIT 1020 TRUCK CRANE
MOUNTED ON 3 AXLE TRUCK
10 TON CAPACITY

production parade

¼ AND ⅜ YD.
EXCAVATORS

5 TO 10 TON CRANES





UNIT 514 . . . ⅛ YD.
CLAMSHELL

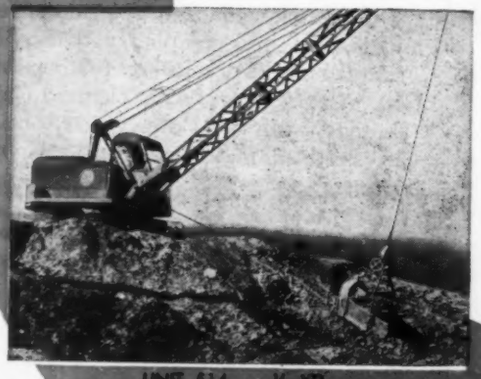
UNIT 1020 . . . ¾ YD.
TRENCHOE

CONTACT
FACTORY
DIRECT
FOR PRICE
AND DELIVERY
or See Your Dealer

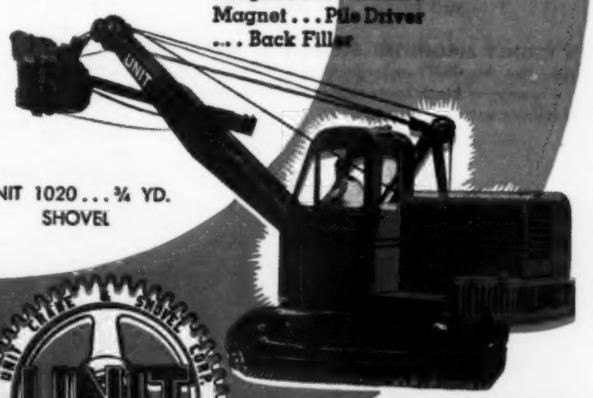
Full-Vision Cab **.. ENABLES OPERATOR TO SEE IN ALL DIRECTIONS**

Convertible **TO ALL ATTACHMENTS**

Shovel . . . Clamshell
Dragline . . . Trenchoe
Magnet . . . Pile Driver
. . . Back Filler



UNIT 514 . . . ½ YD.
DRAGLINE

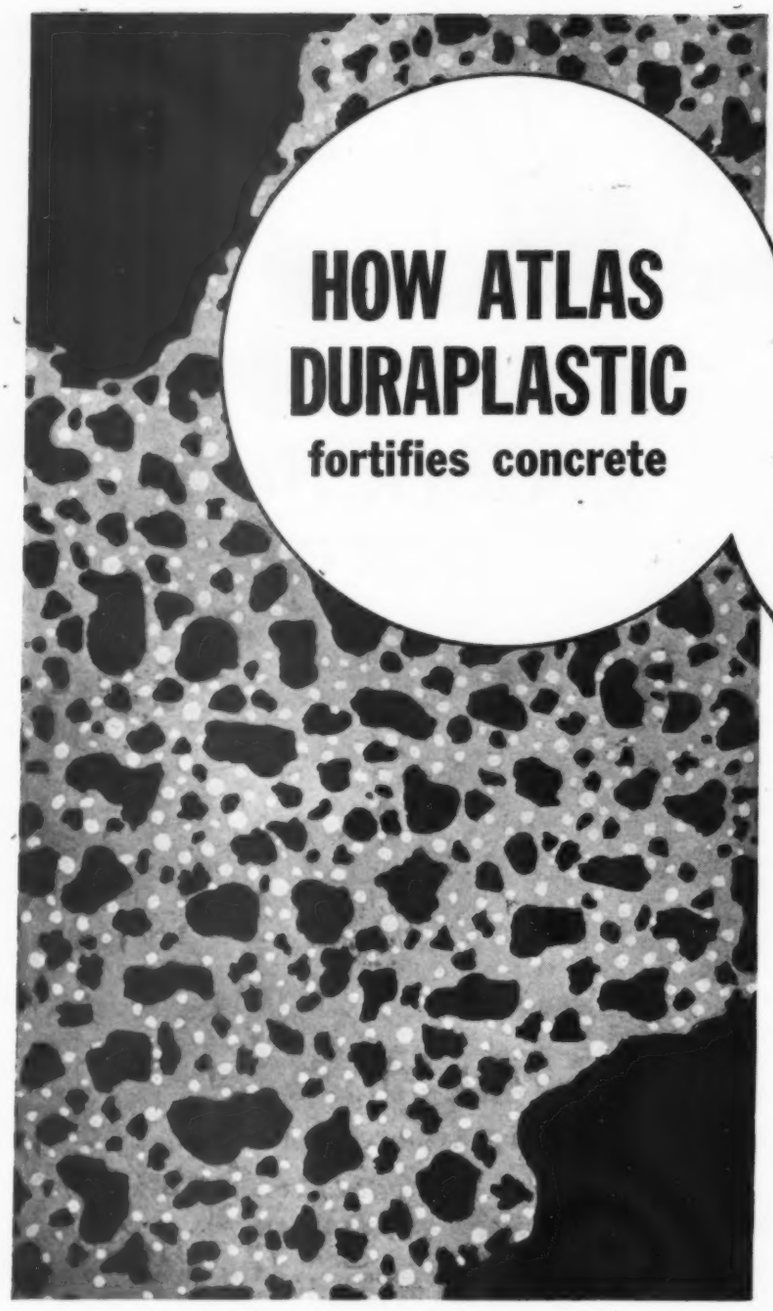


UNIT 1020 . . . ¾ YD.
SHOVEL

UNIT CRANE & SHOVEL CORP. **MILWAUKEE 14, WISCONSIN, U.S.A.**

Address: **6407 W. Burnham St., Milwaukee 14, Wis.**

A 5005-1PCU-R3



HOW ATLAS DURAPLASTIC fortifies concrete *against effects of freezing and thawing*

A HIGHLY MAGNIFIED SECTION OF DURAPLASTIC CONCRETE would look something like this. The two large black areas represent small portions of coarse aggregate; the remaining black spots represent sand; grey area represents cement paste; white dots represent entrained air bubbles.

CONCRETE resists the effects of freezing and thawing weather—and has greater durability—when made with Atlas Duraplastic air-entraining portland cement. Here's how:

Duraplastic provides the proper amount of entrained air needed for satisfactory field performance. The air bubbles are not large globules, but millions of disconnected tiny cells uniformly distributed throughout the entire mass.

Because of the extra plasticity imparted by the air cells, Duraplastic cement requires less mixing water for a given slump. This reduces segregation and bleeding, thus fortifying the concrete against freezing and thawing weather.

Duraplastic is backed by years of research and testing, and complies with ASTM and Federal Specifications. For further information, write Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, New York.

OFFICES: Albany, Birmingham, Boston, Chicago, Cleveland, Dayton, Des Moines, Duluth, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Waco

RS-D-54

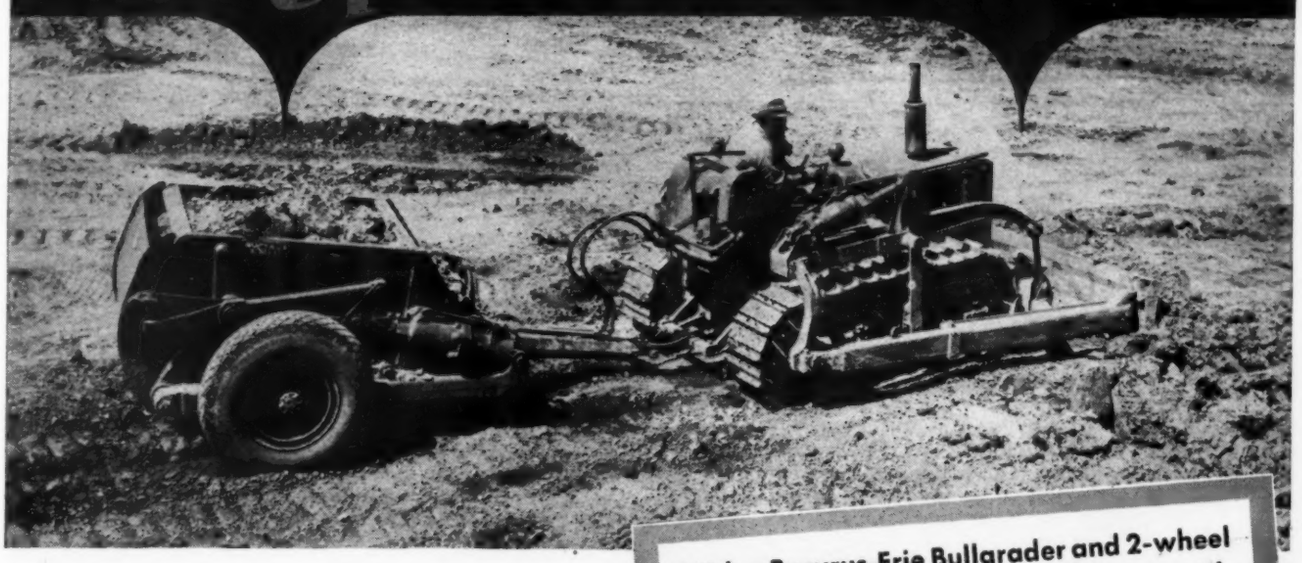
ATLAS DURAPLASTIC TRADE MARK REG. U. S. PAT. OFF.

AIR-ENTRAINING PORTLAND CEMENT

MAKES BETTER CONCRETE AT NO EXTRA COST

"THE THEATRE GUILD ON THE AIR"—*Sponsored by U. S. Steel Subsidiaries—Sunday Evenings—ABC Network*

Double Up on work capacity



With a Bucyrus-Erie Bullgrader and 2-wheel scraper combination you get both versatility and long-haul capacity — a complete dirt-moving unit operated by one man.

YOUR tractor is doubly equipped for maximum usefulness when you use the dual unit combination of a Bucyrus-Erie Bullgrader (or bulldozer) and a two-wheel scraper because you put both ends of the tractor to work. With the blade as front-end equipment, the scraper hitched to the drawbar, and both units hydraulically operated from the same pump, you have a one-man team that materially speeds up your dirt moving — loading and hauling the long-haul dirt with the scraper and moving the short-haul dirt with the Bullgrader.

By alternating the hydraulic control from one unit to the other the operator of the dual unit can: (1) dig dirt from a cut, (2) place dirt in a fill, (3) level the fill, (4) keep hauling roads in good shape, (5) backslope, (6) build shoulders, (7) cut ditches, and perform many other time-saving jobs. There's no delay, no time lost in switching from one kind of service to another. The operator simply changes his control from scraper to blade and back again, as the job requires.

This hook-up will give your tractor the extra work capacity that quickly cuts your dirt-moving costs. Find out about the complete line of Bucyrus-Erie tractor equipment from your International Industrial Tractor Distributor. Bucyrus-Erie Co., South Milwaukee, Wisconsin.

82T47

See Your INTERNATIONAL Industrial Tractor Distributor

For BUCYRUS ERIE Balanced Tractor Equipment

Make it hot...on the spot!

Truck-mounted Booster. Heats by direct firing. Loads direct to distributor or returns to tank car. 2 sizes for truck or trailer mounting.

Check These Advantages

- Heats material 3 times as fast as steam.
- Heats to higher temperatures.
- No steam or water necessary.
- Heats only amount of material required.
- Circulates material while heating — no separation or damage — assures uniform application.

Get All the Hot Material You Need for Volume Operation AND GET IT FAST...with Cleaver-Brooks Portable Boosters

IF speedy and economical handling and heating of pumpable bituminous material is your problem — then it will pay you to investigate Cleaver-Brooks Portable Pumping Boosters.

With Cleaver-Brooks Boosters, the heating speed does not depend on the size and conditions of tank car coils. It heats direct and 3 times as fast as any other method. What's more, you need only heat the amount of material you need — no heating of the entire car.

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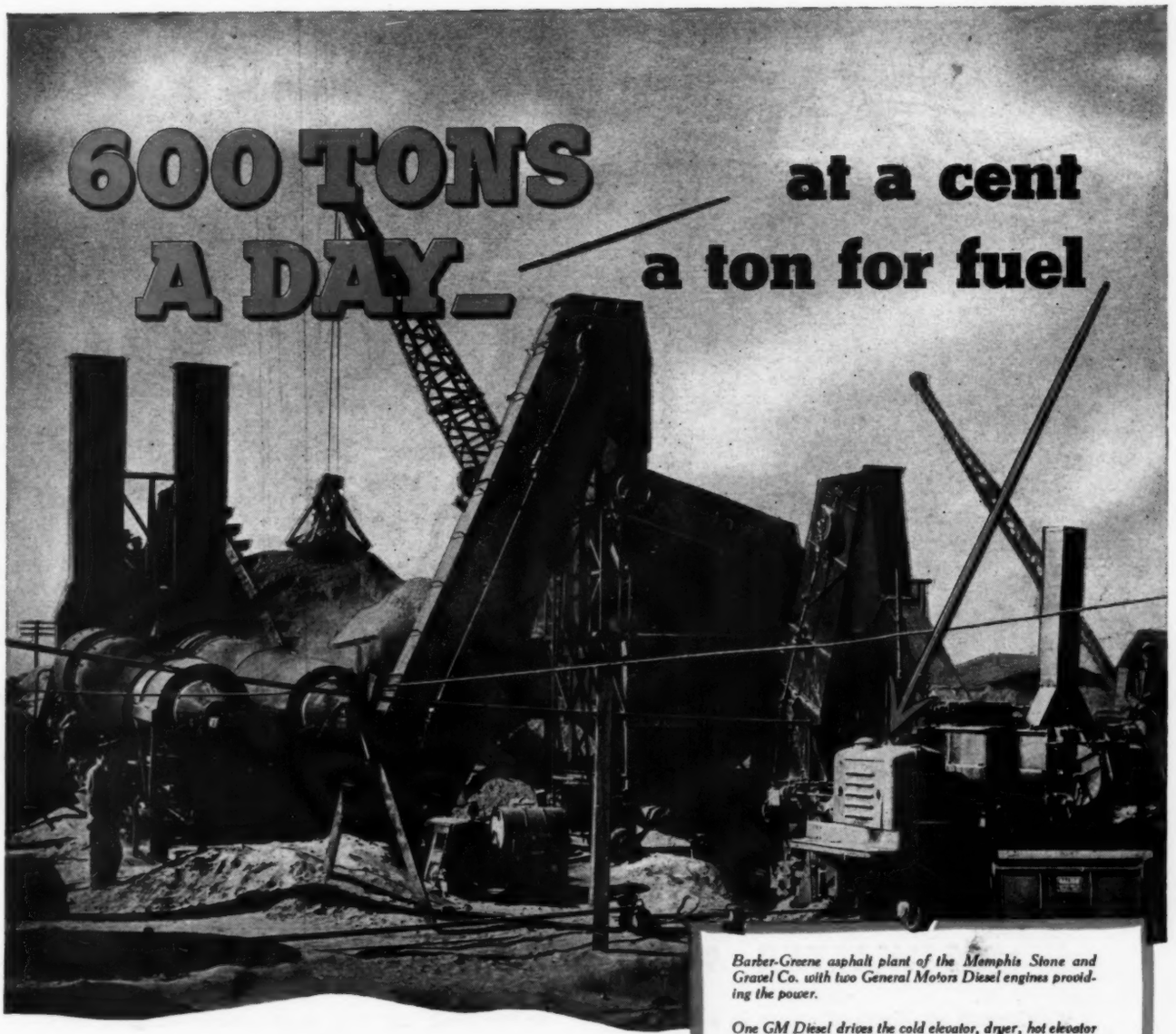
Write on Your Business Letterhead . . . For the Bituminous-Mix Calculator — a ready reference slide rule showing weight of mix needed in lbs. and tons based on area and depth of area to be covered.



Barber-Greene asphalt plant of the Memphis Stone and Gravel Co. with two General Motors Diesel engines providing the power.

One GM Diesel drives the cold elevator, dryer, hot elevator and gradation unit. The second runs the pug mill and the elevator which keeps it supplied.

Processing asphalt is a tough dirty job. It's just the kind of job that's a natural for GM Diesel power. GM Diesels can take a beating, keep steadily on the job, and all the while deliver power at exceptionally low cost. In this case on the Barber-Greene asphalt plant, at 1¢ a ton for fuel.

Being 2-cycle with power at every downstroke, GM Diesels are compact and can go to work in places where Diesels couldn't be used before. They're easy starting, need little attention, and are quick to respond to varying loads.

Construction men everywhere are astonished at the money GM Diesels save them. It's sure worth looking into. Let us know and we'll send along all the facts and details.

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—both made possible by the *100% TRACTION* of *WALTER 4-POINT POSITIVE DRIVE*

YOU meet all kinds of snows in a Winter—from average falls to raging blizzards and deep drifts.

Walter Snow Fighters bring you distinct advantages for *every* type of snowfall. In light to normal snows (few inches to few feet), Walters maintain speeds of 20 to 30 mph. to provide wide dispersion. At such high speeds, the required number of trips is made faster—more miles are cleared per hour—spreading action minimizes re-handling of the same snow—banks and windrows are avoided.

In very deep snow and drifts, the tremendous power and traction of Walter Snow Fighters smash through without slipping or stalling. The special design and rugged construction show to full advantage in this punishing work.

Walter Snow Fighters are available in models from 150 to 300 hp., gasoline or diesel, with wide choice of correctly designed plows and special equipment to meet your special needs.

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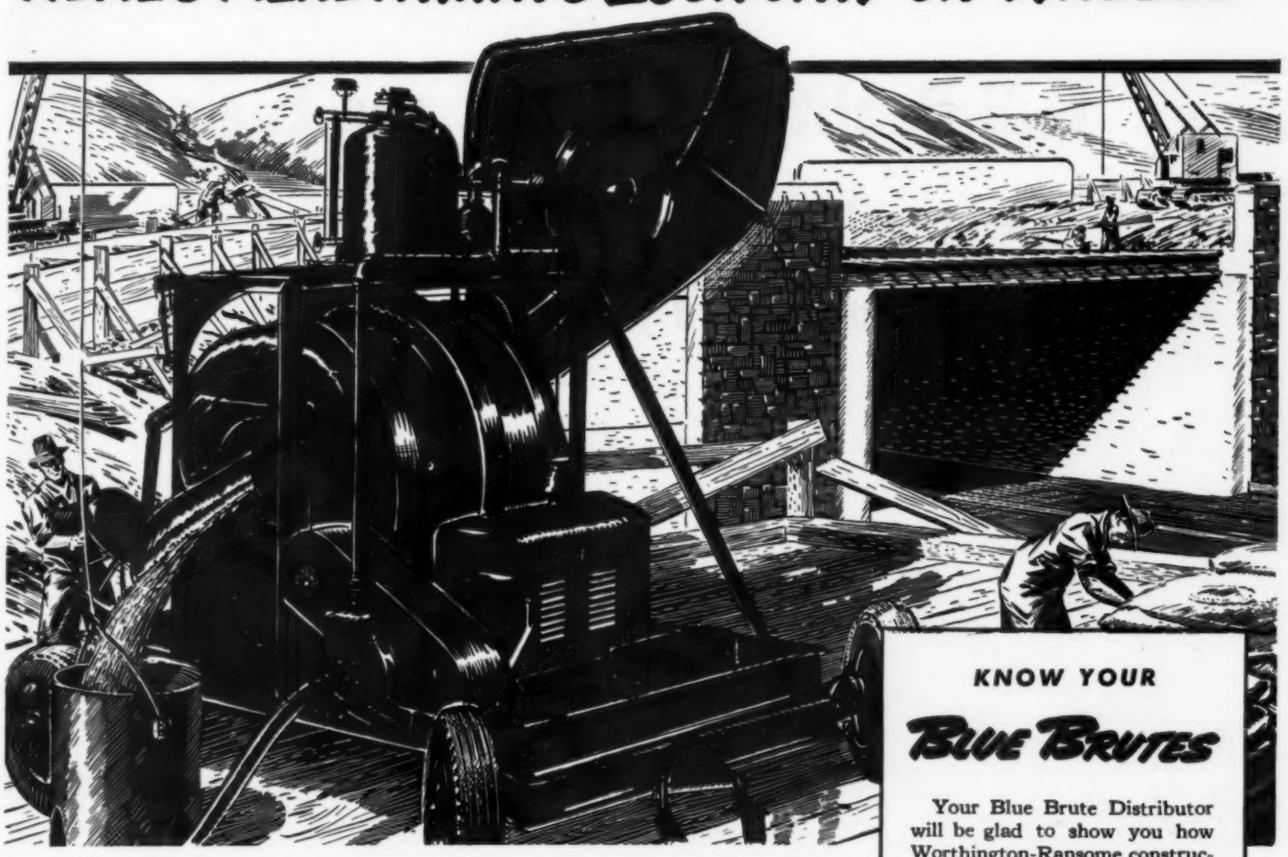
WALTER SNOW FIGHTERS

HERE'S REAL "MIXING ECONOMY ON WHEELS"



For getting around in a hurry, with faster, better performance all the way, there's nothing like Ransome's 28-S Portable Mixer. Wheeled wherever you need it, this tireless Blue Brute keeps right on producing more concrete at lower cost — on job after job, year after year. Features like these show you why:

Drum rollers of genuine carwheel metal, turning independently on Timken bearings . . . Roller tracks welded to drum and machined to a true circle, for smoother operation and longer life . . . Extra-heavy, alloy steel roller shafts, adjustable for accurate centering of drum . . . Two-piece, hydraulically operated discharge chute . . . Enclosed V-Belt drive, with helical gears in an oil bath . . . Ransome's exclusive mixing action, for fast, uniform mixing.

IT WILL PAY YOU

to know *all* about the 28-S and the smaller Blue Brute Portable Mixers — 3½-S, 6-S, 11-S and 16-S. Learn how they can help you beat estimates and schedules. See your nearby Worthington-Ransome distributor for performance facts that prove *there's more worth in a Blue Brute.* RJ-7

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Pavers, Portable and Stationary Mixers, Truck Mixers, Pneumatic Placing and Grouting Equipment and Accessories.

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Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Self-Priming Centrifugal Pumps and Accessories.

WORTHINGTON

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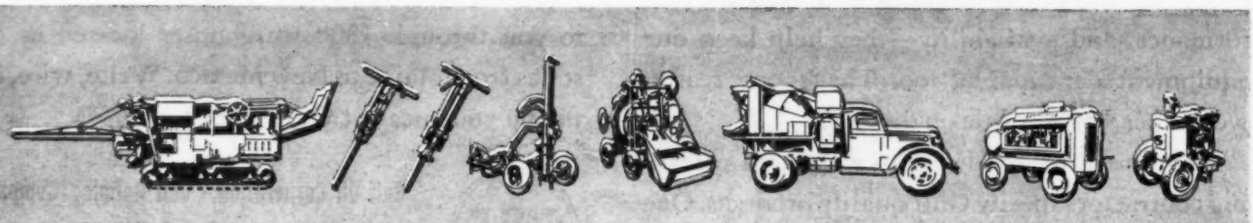
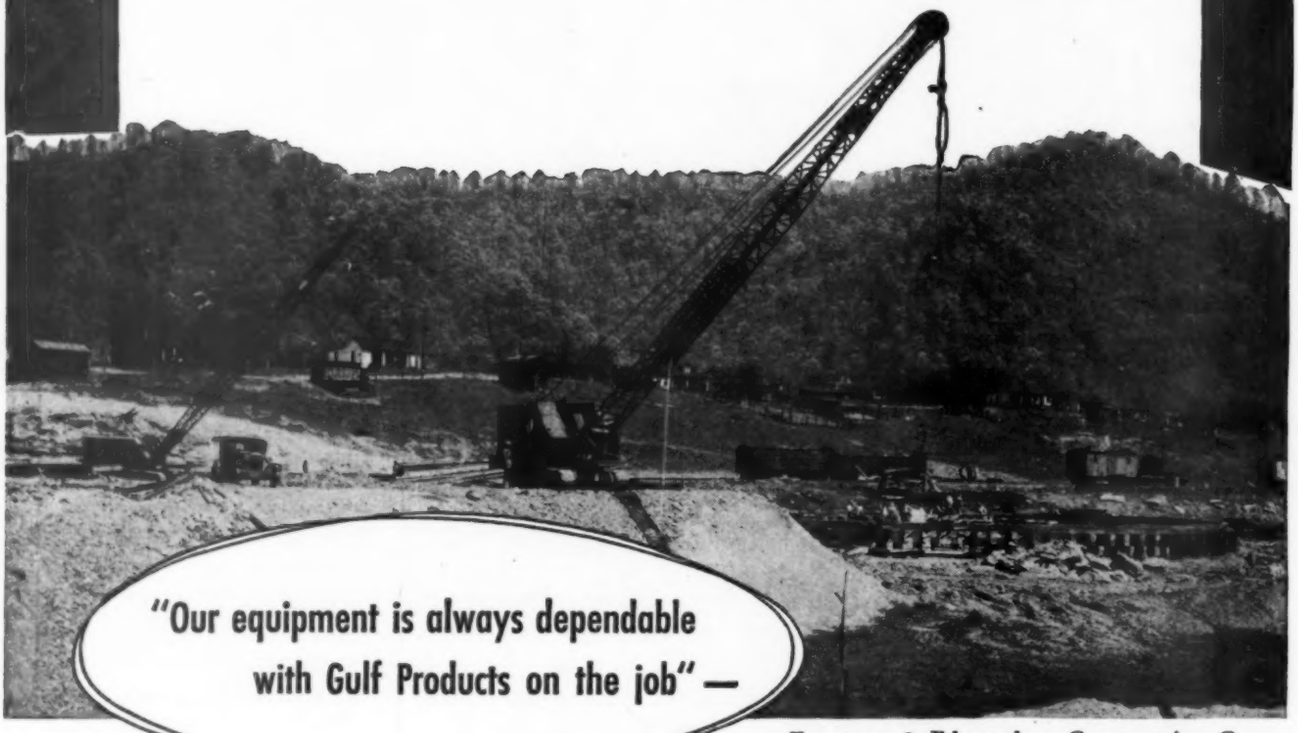


IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

Gulf Quality Lubricants and Fuels

help contractor keep ahead of schedule on railroad yard project—



"Our equipment is always dependable with Gulf Products on the job"—

SAYS S. N. CONNOR, SUPERINTENDENT

Ferguson & Edmondson Construction Company, Pittsburgh, Pa., has the contract for enlarging the Chesapeake & Ohio Railroad yard at Shelbiana, Ky. Costing approximately $1,000,000, the job involves moving 500,000 yds. of dirt and constructing turntable, roundhouse, new station and auxiliary buildings.

"WE have our share of worries on a job of this kind," says Mr. Connor. "But lubricants and fuels are not among them—we use Gulf products. Always dependable—in quality, performance, and availability—they help keep our equipment dependable, too. That's one reason we're ahead of schedule on this job."

There are three solid reasons why so many leading contractors specify Gulf quality products. One is performance—less wear and smoother operation for equipment. Another is the high type of engineering service Gulf provides to insure the right types and grades of lubricants and fuels for every unit. Third, Gulf's prompt delivery service.

Gulf quality fuels and lubricants are available to you through 1200 warehouses located in 30 states from Maine to New Mexico. Write, wire, or phone your nearest Gulf office today.

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Tractor-drawn for handling heaping yardages from 6 to 28 cu. yards.

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Single and multiple drum with universal or roller fairleads.

☆ **BULLDOZERS**
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Available in light, medium, and heavy duty models.

Point for point Wooldridge Terra-Cobras offer you greater yardage profits. When you put Terra-Cobras on your job you gain these outstanding Wooldridge performance features.

1. FIVE years of fully tested and proved performance under all types of operating conditions.
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EARTHMOVERS

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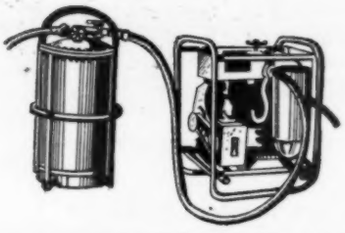
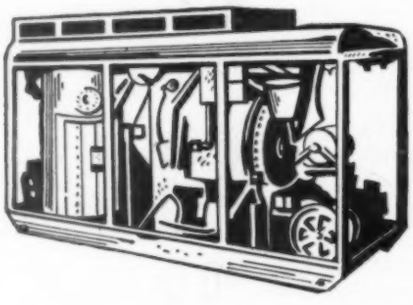
Army and Navy surplus—some used, some unused. Many sizes and types of Water Purification, Chlorination and Distillation units available at bargain prices.

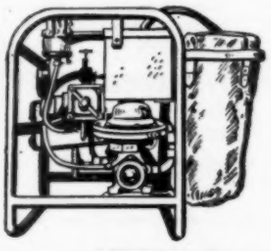
If you have not yet received your copy of the booklet pictured above, send for it today; it contains illustrations and descriptions of many available units other than those shown on this page, and tells where this equipment is located.



PORTABLE WATER PURIFICATION UNIT (MOBILE)—Consists mainly of a pumping unit and a filter unit. The water is cleaned by harmless chemicals. Forcing water reversely through the filter washes the unit thoroughly.



WATER DISTILLATION UNIT—Some units are trailer mounted, fully equipped with tires, ready to move to the working location; other units are portable—neat, compact and mounted on skid-type frames. Unit consists of a gasoline engine, steam compressor and other parts and necessary piping, all assembled and mounted on a structural steel base.



HYPO-CHLORINATION UNIT (AUTOMATIC)—Chlorinates from 2 to 100 gallons of water per minute. Unit consists of hydraulic operated hypochlorinator, water meter, pressure regulating valve and manual range adjusting valve.

For copy of booklet and details of current sales address any WAA Customer Service Center, mentioning sales Programs A-78 and A-79.

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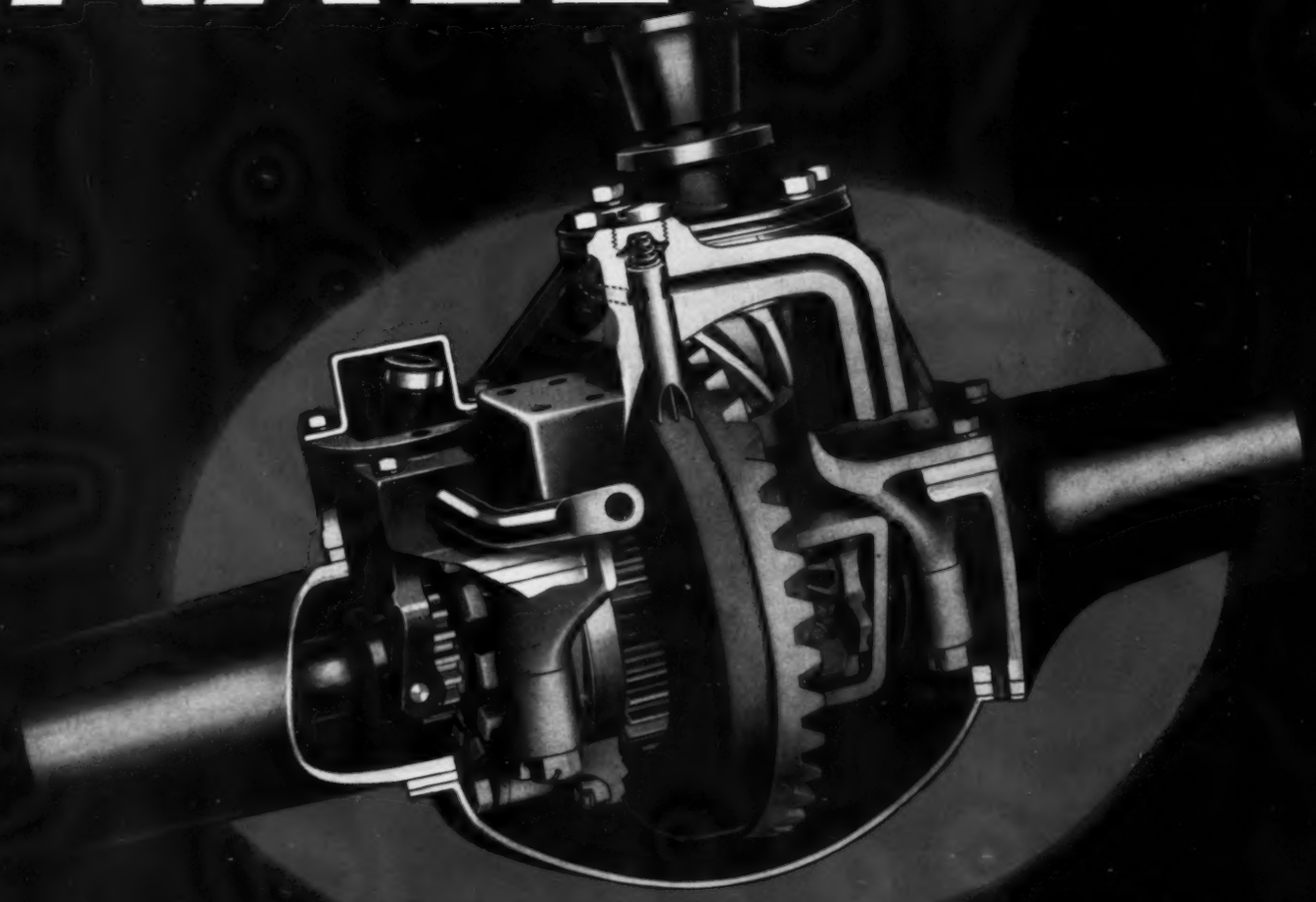

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there's nothing faster -nothing better

Designed for really heavy work, no other demolition tool in the 80-pound class can outperform the CP-117. It is particularly recommended for the speedy demolition of dense concrete and other extremely hard materials. Valve-actuated, it strikes a very heavy blow — yet is easy to hold, having no kickback, and it does not require "riding." Furnished with either spring or latch type retainer.

Accessories that may be used with this tool include spade, digging tool, asphalt cutting chisel, peg point, narrow chisel, and tamper with shank. Write for further information.

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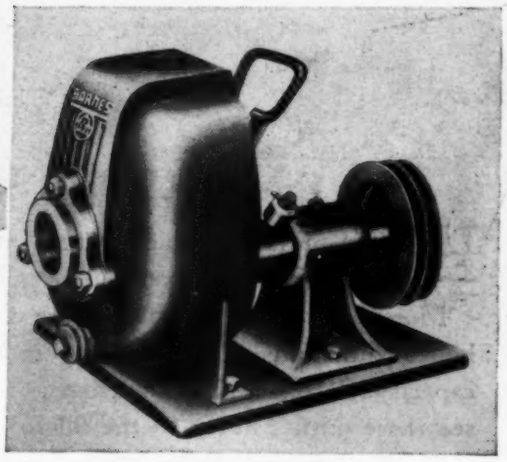

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EARTH moving problems turn into jobs that pay plenty of profits when International Diesels power the work!

More and more contractors are finding this out. They see how International Crawlers lug through heavy going to boil up capacity loads in their scrapers. And when the blades are up they see these outfits hurry to the fill to deliver big hourly yardage.

Then, when they discover how International's unbeatable operating economy keeps costs down, they know that here's *power that pays*. The low maintenance and fuel requirements of International Diesel Crawlers makes successful bidding and profitable results assured.

For facts about the benefits you get in these power-packed tractors, visit your International Industrial Power Distributor. Let him help you select equipment and the *power that pays*.

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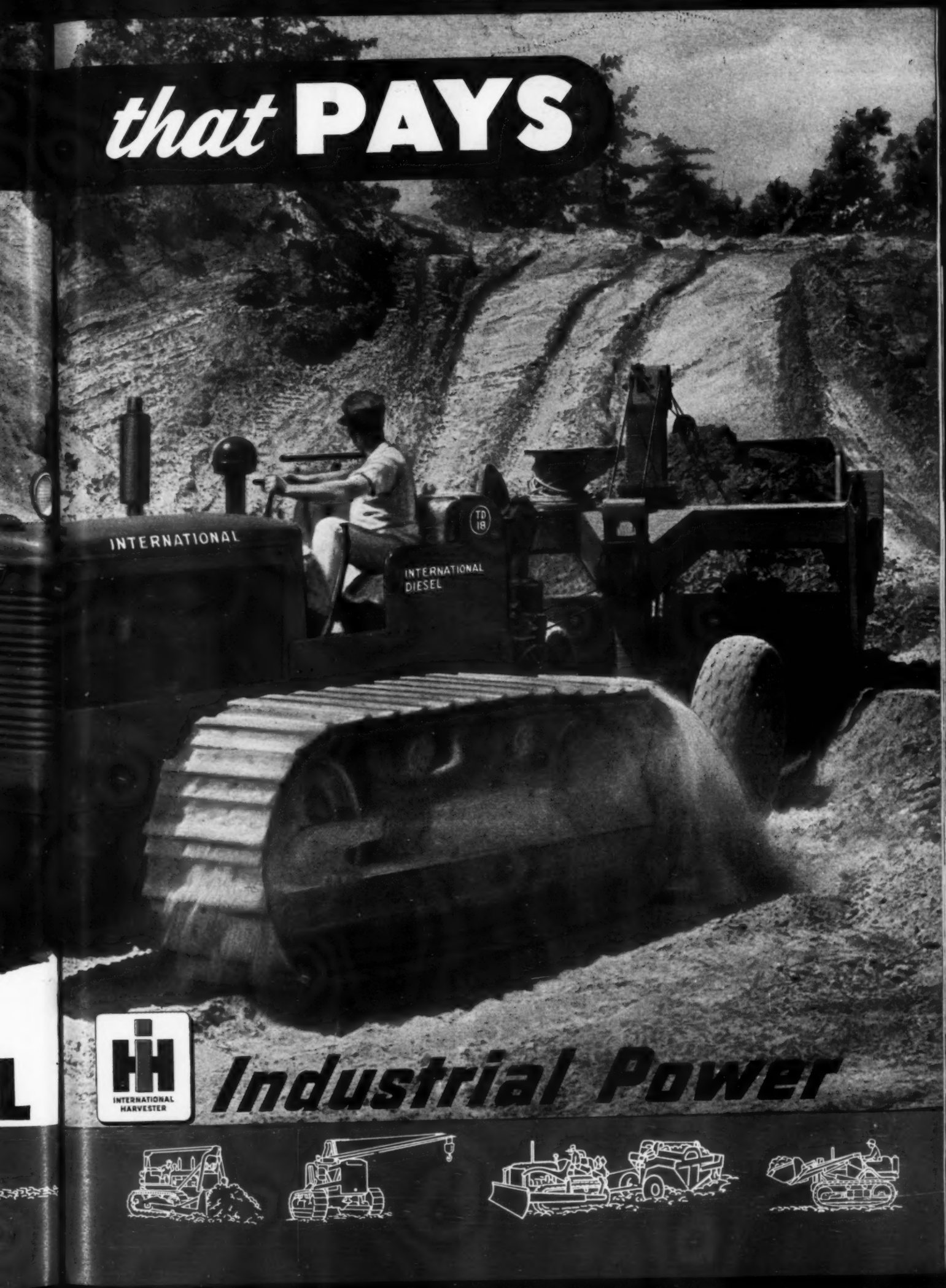
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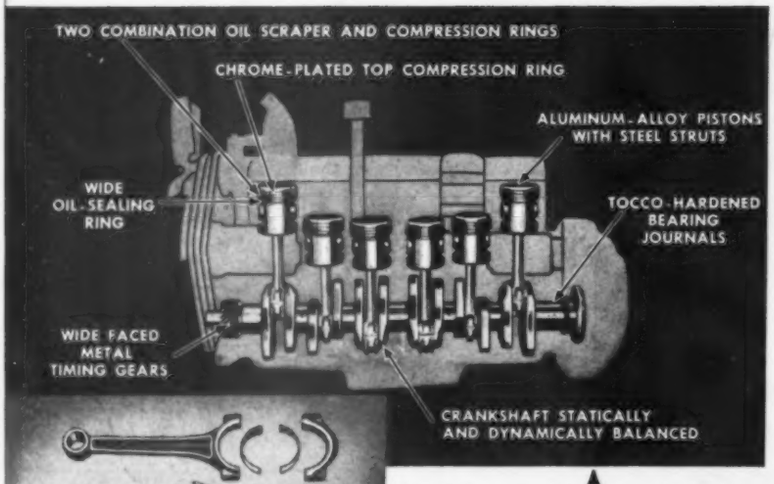
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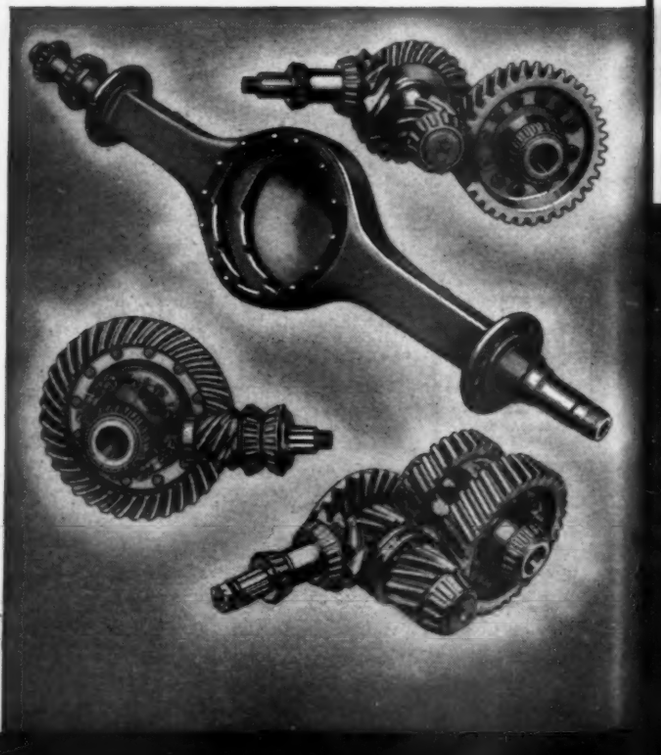
7-bearing crankshaft, with Tocco-hardened journals. Aluminum alloy pistons with four rings. Replaceable multiple-layer bearings.

Rugged, dependable rear axles—single-speed; single-speed, double-reduction, and 2-speed, double-reduction fit every hauling need.



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DODGE "Job-Rated" HEAVY DUTY TRUCKS

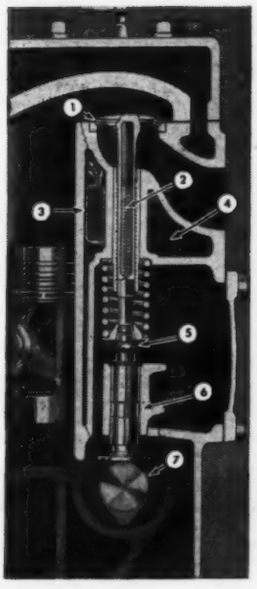
FROM radiator to rear axle, these heavy-duty trucks were especially engineered and built for *long, economical* service.

They're powered by two brilliant *truck* engines, of 282 and 331 cubic inch displacement. Horsepower-to-weight ratios reach a new high! These engines develop 225 and 270 pound-feet of torque respectively—and maintain high torque output over a wide speed range.

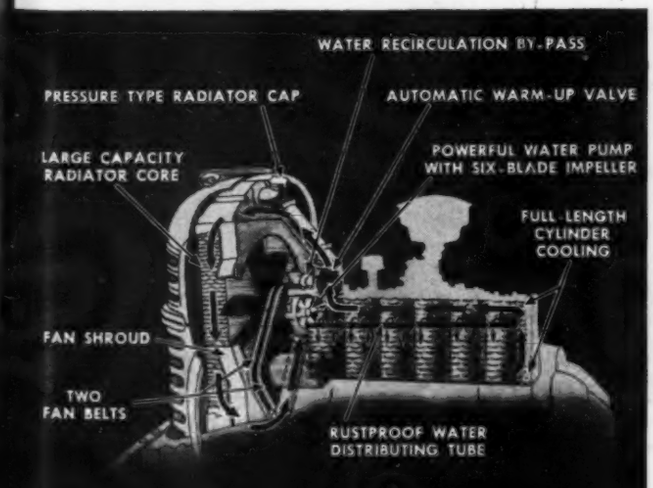
Engine cylinder walls, of chrome nickel molybdenum alloy cast iron, are *so hard* that wear is almost non-existent. Valves are made of silchrome, a special valve material of exceptional durability. For long life, exhaust valves are sodium-cooled; valves and valve seat inserts are stellite-faced.

Everywhere, unnecessary surplus weight is eliminated by improved design and advanced metallurgy. New and strictly *heavy-duty* clutches, and a remarkably efficient five-speed transmission—coupled with rear axles of entirely new design—provide a highly efficient transmission of driving torque to the wheels. Despite their husky construction and rugged strength—these trucks handle with ease, even on steep grades with capacity loads.

If *your* transportation requirements fall within the 18,500 to 23,000-pound gross vehicle weight ranges (up to 40,000 pounds G.T.W.) . . . get the complete story of these great new Dodge *"Job-Rated"* heavy-duty trucks from your Dodge dealer. We believe you'll find them your long-awaited answer to *lower-cost hauling* in their capacity ranges!

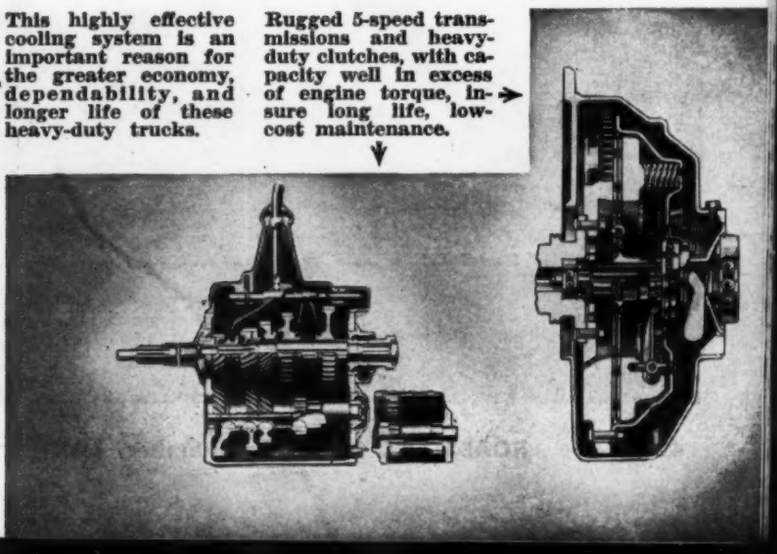


1. **Stellite-faced exhaust valves and seat inserts. (All valves and valve seat inserts are of hard, durable silchrome.)**
2. **Sodium-cooled exhaust valves.**
3. **Rustproof water distributing tube for exhaust valve seat cooling.**
4. **Large water pockets surround valve stems for quick heat dissipation.**
5. **Self-locking adjusting screws facilitate tappet adjustments.**
6. **Tappets lubricated by pressure feed for long life.**
7. **High-test cast iron alloy camshaft supported by four large bearings.**



This highly effective cooling system is an important reason for the greater economy, dependability, and longer life of these heavy-duty trucks.

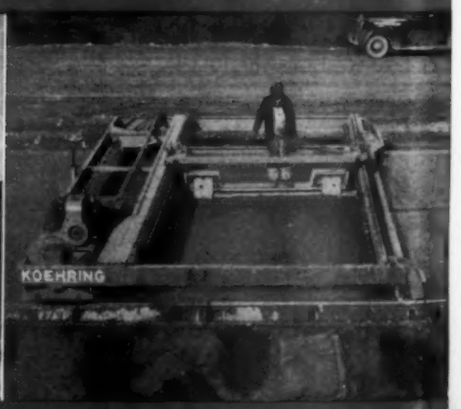
Rugged 5-speed transmissions and heavy-duty clutches, with capacity well in excess of engine torque, insure long life, low-cost maintenance.



KOEHRING

No turn-time...

Other Koehring Heavy-Duty units to help you



Koehring excavators range in size from ½ yard up. Each built to exacting Heavy-Duty standards. See the Koehring 605 (1½ yard), Koehring 304 (¾ yard), Koehring 205 (¾ yard).

Koehring Pavers have poured more concrete highways than any other. Get Bulletin on Koehring 34-E Twinbatch, New 1947 model of a famous line. Ask about Koehring Longitudinal Finisher, a Koehring exclusive.

DUMPTOR

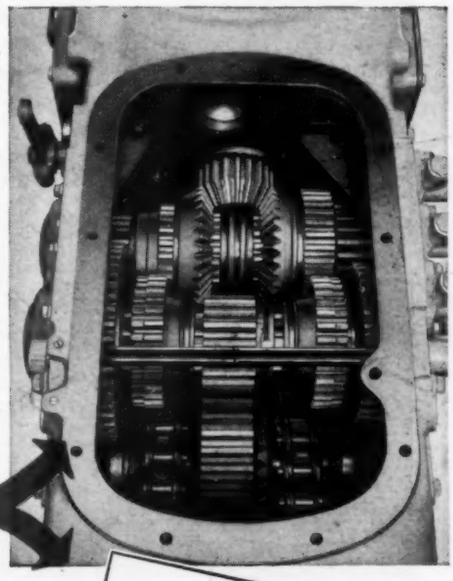
More Haul-time

Dumptor never turns on shuttle hauls, runs backward as fast as forward

Are slow turns at the shovel, at the dumping point robbing you of important hauling time that could increase your profits? Time your present shuttle haul operation. Find out just how much turning costs you. Then, check Dumptor savings.

Here's How Dumptor Works On Shuttle Hauls: Reverse speeds, three of them, are just as fast as the three forward speeds. On shuttle hauls, you never turn the Dumptor, either at the shovel or at the dumping point. You come in to the shovel, engine first. Loaded, you travel body first; at the dumping point, you're in the right position for instantaneous dumping, without a single turn.

Transmission Built for Shuttle Work: Dumptors, and only Dumptors, can shuttle without asking for transmission trouble. Unlike the conventional truck transmission, the Dumptor transmission is especially designed for this type of work. Gears that produce reverse travel are just as large as the "forward" gears. That's why there's no undue stress, no need for excessive lubrication, no transmission trouble.

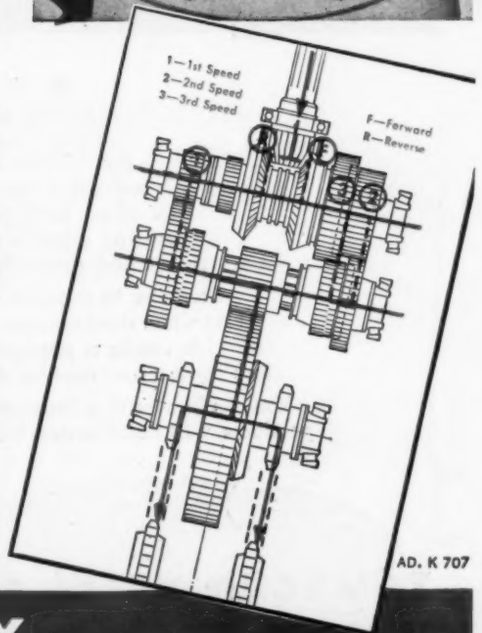


High speed travel without turn delays is only one reason why fewer hauling units will do the job if you're using Dumptors. Here are three other reasons:

Instant Dumping — No Body Hoist: Saves 10 to 20 seconds every time it dumps. No waiting for slow-raising body hoist. Dumps fast even in zero weather. Kick-out pan leaves body clean.

Drive Axle Built For Rock Hauling: Four-inch chrome steel drive axles are heat-treated. Heavy steel case protects entire assembly. Steel dump body has 4" channel reenforcements. Steering axle oscillates to absorb frame-twisting shocks of rough haul roads.

Easy to Maintain: Everything accessible. One man can grease Dumptor in 5 minutes. Clutch pulls out in a fraction of usual time because motor is not moved, transmission case is not touched. Every transmission gear is removable through one cover. No body hoist maintenance, because Dumptor has no body hoist.



AD. K 707

Experienced Dumptor engineers are ready to survey your shuttle haul problem. Contact your Koehring distributor today.

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TRUSCON WELDED STEEL FABRIC

Equalizes Load Stress and Helps Maintain High Pavement Efficiency

Plain Pavement
Open Crack
Structural Action at Crack in Plain, Non-Reinforced Pavement
Reinforced Pavement
Closed Crack
Structural Action at Crack in Truscon Welded Steel Fabric-Reinforced Pavement

Note that as heavy wheel load approaches crack in plain pavement, slab end carries entire load weight with no assistance from non-loaded slabs.

As wheel load approaches closed crack in Truscon Welded Steel Fabric reinforced pavement, aggregate interlock renders the crack-joint shear resistant, and *both* slab ends, instead of one, carry the load.

● The tremendous landing impact of giant aircraft is no greater than that to which almost every square foot of your highways is subjected each day. The use of Truscon Welded Steel Fabric for reinforcement is highly desirable. Authoritative and official loading tests prove that cracks in reinforced concrete pavements consistently average a load transfer of about 48% at all seasons of the year. This value represents practically 100% shear-resisting capacity, since a load transfer of 50% is the absolute maximum that could occur theoretically under any conditions.

Cracking in concrete pavements cannot be eliminated entirely, but experience has proved that when the pavement slab is reinforced with Welded Steel Fabric between joints, the formation of wide cracks is prevented. The reinforcing holds the aggregate of the fractured slabs in close contact and enables the slab to function as a unit rather than as individual parts.

You can be sure that Truscon Welded Steel Fabric Reinforcement, and associated Truscon steel roadbuilding products, will build better, lower-cost roads for the communities you serve, and greater prestige for you.

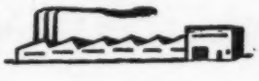
TRUSCON STEEL COMPANY
Reg. U. S. Pat. Off.
YOUNGSTOWN 1, OHIO • Subsidiary of Republic Steel Corporation

Manufacturers of a Complete Line of Welded Steel Fabric . . . Concrete Bars . . . Contraction Joints . . . Dowel Assembly Units . . . Curb Bars . . . Complete Steel Buildings.

More Cities, Counties, States,

than ever now *remove* ice and snow with STERLING *"Auger Action"* Rock Salt

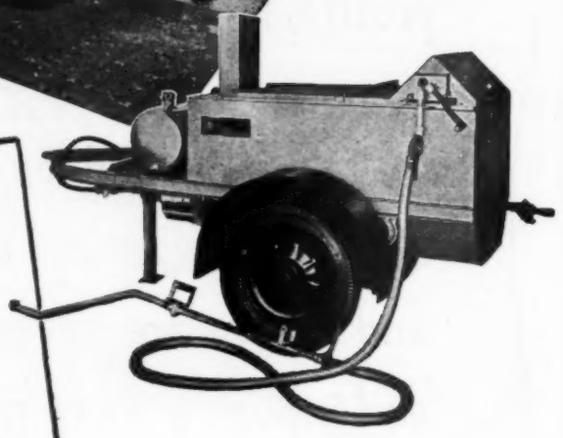
Icy pavements and snow-filled streets and highways slow or block traffic! Bring death and injury! They lower factory production, cut store profits, bring customers untold inconvenience... even cause fuel and food shortages.

Snow and ice can be quickly removed with STERLING *"Auger-Action"* Rock Salt! Time, labor and money are saved. People, traffic, business and industry keep going!  Do as others are doing. Use STERLING Rock Salt. *ORDER NOW! in* carloads, bulk or 100-lb. bags. A trained representative will gladly call. *Write Today!*

International Salt Company, Inc. Scranton, Pa.

Keep on Top of That Black Top!
REPAIR WITH LITTLEFORD UNITS

LITTLEFORD POWERED TRAIL-O-ROLLER has compaction of five-ton tandem: trails at any speed; easy to operate, efficient, economical.



Night and day your roads are being pounded by endless traffic. It can't let up and neither can your repair crew. Track down pavement breaks with Littleford bloodhounds. The 84-HD Kettle can repair any road by applying asphalt to stones, gravel, etc. The 84-HD includes double heat circulation and screened reservoir, and these features assure faster heating, faster draw-off of material, and the safest and most economical kettle operation. Combine with Littleford's famous Trail-O-Roller and their No. 101 Utility Spray Tank and you have a combination that really makes for speed and economy, and that's what you want the year round. It's the antidote to black top disrepair!

Littleford 101 Utility Spray Tank is combination of three units: Spray bar for spraying, hand spray for patch work, pouring pot outlet for filling cracks.

LB BLACK TOP ROAD MAINTENANCE EQUIPMENT SINCE · 1900

LITTLEFORD

LITTLEFORD BROS., Inc.

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. . . for the hard pull. . . for the continuous pull —that's where "HERCULES" (Red-Strand) Wire Rope proves its outstanding stamina!

Yes, here is a truly *tough* rope in Round Strand and Flattened Strand constructions—both Preformed and Non-Preformed —designed and fabricated to correctly meet every "heavy duty" Wire Rope requirement . . . regardless of clime, place or condition.

So, when your next job calls for *economical* service, over a 'long pull'—play safe, and let the Red-Strand be your buying guide.

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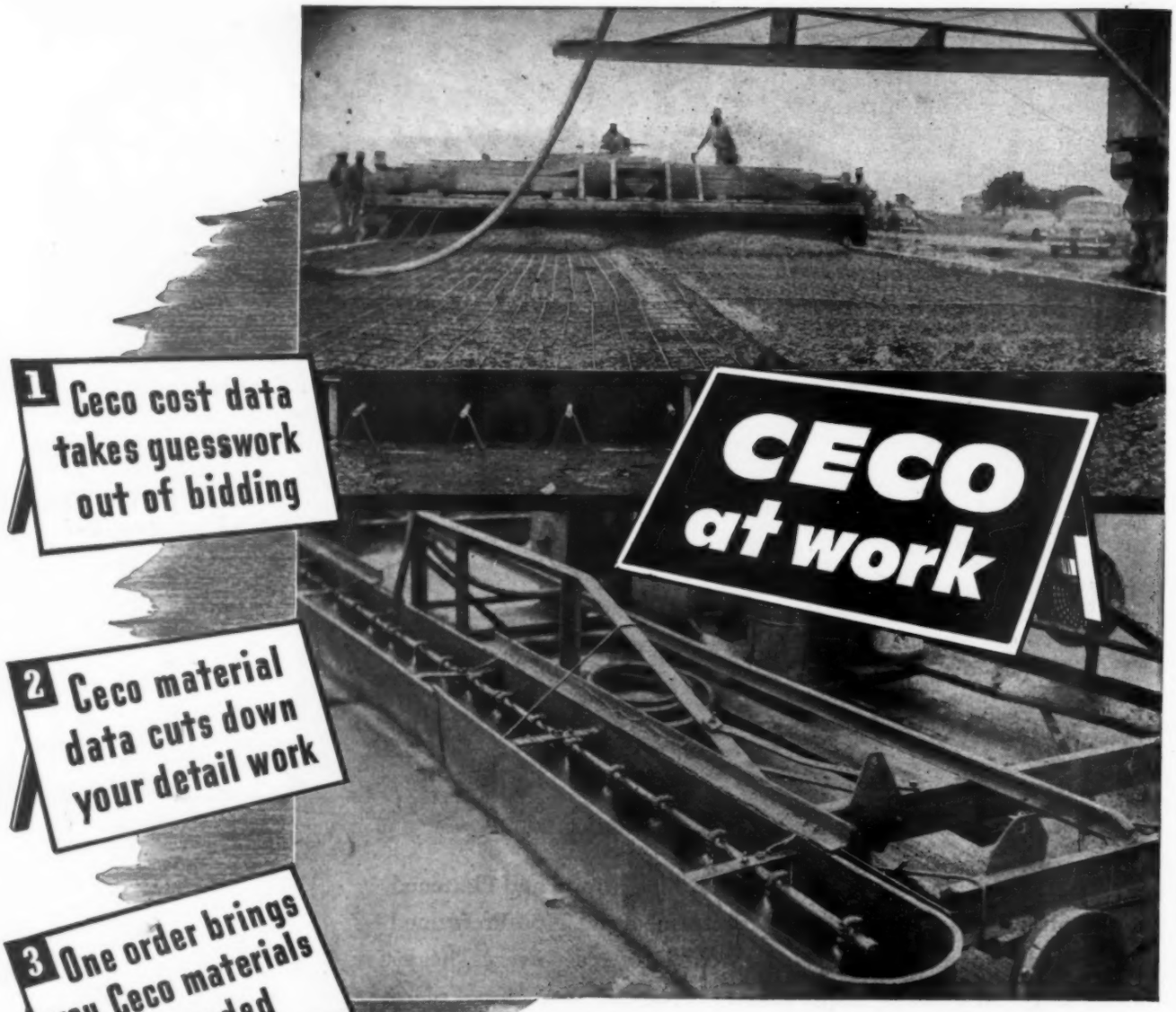
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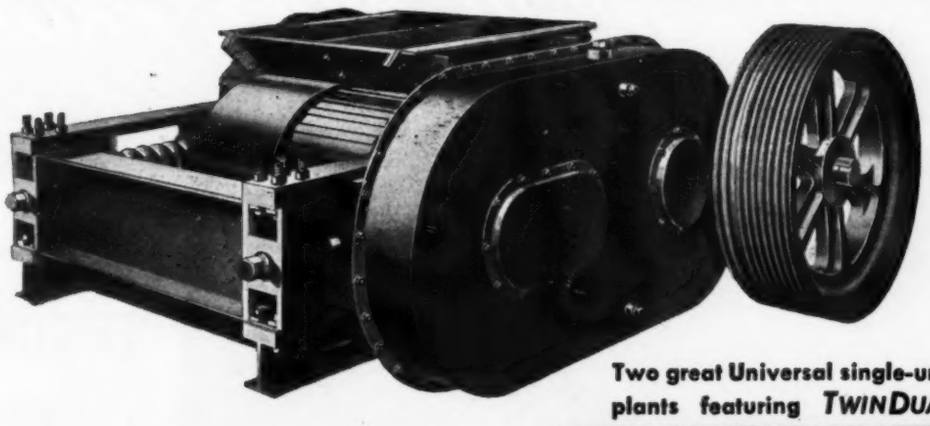
In construction products **CECO ENGINEERING** *makes the big difference*

UNIVERSAL *TWINDUAL** ROLLS



Two great Universal single-unit portable plants featuring *TWINDUAL** ROLLS

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Universal *TWINDUAL** ROLLS provide the approximate capacity of two separate roll crushers. You get all the advantages of two-stage secondary crushing operations without the bulk and weight. This exclusive Universal unit doubles primary capacity and reduces jaw wear by permitting 100% wider jaw discharge opening. That's why *TWINDUAL* ROLLS when combined with the world famous Universal overhead eccentric jaw crushers are marking a new era in complete single unit dual portable crushing plants. Smaller primary jaw crushers can be used to gain savings in weight, space and initial cost . . . yet capacity is increased. Two popular Universal portable plants featuring *TWINDUAL* ROLLS are shown here.

*Patented

MORE YARDS PER HOUR
LESS COST PER YARD
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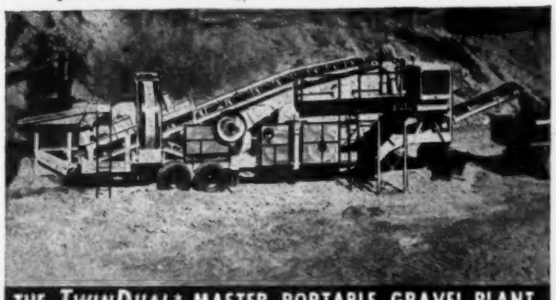

THE *TWINDUAL** MASTER PORTABLE GRAVEL PLANT
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THE 293-Q PACEMAKER PORTABLE ROCK PLANT
Bulletin No. 31A

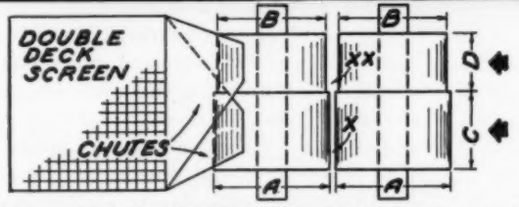

Diagram of feed of *TWINDUAL* Rolls showing double set of rolls which provide two stages of secondary reduction. In operation, crushed material from the primary breaker together with a percentage of material which does not require primary reduction passes over double deck screen. Oversize retained on the top deck is received by the small diameter rolls for coarse crushing. Following this stage of reduction material passes to bottom deck of screen. Rejects are chuted to the larger diameter rolls for the final stage of reduction.

UNIVERSAL ENGINEERING CORPORATION

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ENGINEERS AND BUILDERS OF "STREAM-FLO" ROCK, GRAVEL, AND LIME PLANTS—SCREENING AND WASHING PLANTS—CONVEYORS—APRON FEEDERS

DAY-AND-NIGHT WORK PROVES

"EFFECTIVE LUBRICATION" REDUCES MAINTENANCE COSTS

WHEN machines must run on round-the-clock schedules, that's when you need "effective lubrication" — the ability of your lubricant to *stay in the bearings* despite heavy loads and rough service . . . to give extra long hours of protection. And for that, nothing beats *Texaco Marfak!*

Marfak is tops for bearings in truck chassis, tractors, bulldozers, shovels and other equipment — a tough, tireless lubricant that gives *longer lasting* protection because it prevents rust and seals out dirt and moisture. Saves you money on maintenance costs.

In wheel bearings, *Marfak Heavy Duty* forms a fluid lubricating film inside, retains its original consistency at the outer edges . . . thus sealing itself in, sealing out contaminants . . . assuring longer lasting protection with no need for seasonal change.

For engines — heavy-duty gasoline and Diesel — *Texaco Ursa Oil X★★* assures top efficiency and economy. *Ursa Oil X★★* is fully detergent . . . dispersive . . . highly resistant to oxidation. It keeps engines clean.

Save time and money by using the Texaco Simplified Lubrication Plan. For full details, call the nearest of the more than 2500 Texaco distributing plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

MAKE THIS SIMPLE TEST: Put a little *Marfak* in the palm of your hand. Rub it with a circular motion and notice how it liquefies to a fine oiliness under friction while retaining its original tough consistency in the surrounding "collar." Just so, in a bearing, *Marfak* lubricates wearing surfaces, while its "collar" seals out destructive dirt and moisture, assuring longer bearing life.

TEXACO

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FOR ALL CONTRACTORS' EQUIPMENT

Tune in . . . TEXACO STAR THEATRE presents the TONY MARTIN SHOW every Sunday night. See newspaper for time and station.

ROADS AND STREETS

NOVEMBER, 1947 • VOL. 90 • No. 11

18-Ton Diesel Trucks

Speed Hot-Mix Resurface Job in Florida

U. S. 1 down the east coast from Jacksonville to Miami is carrying such heavy traffic on its existing 2-lane pavement, that any widening and resurfacing work must of necessity be planned around the safety of this traffic and of construction workers.

Yet in spite of having to maintain traffic through the work, Duval Engineering & Contracting Co., Jacksonville road contractors, made unusually good daily footages this past autumn in resurfacing a 16-mile section just south of Jacksonville.

The most noticeable single item of strategy was the use of very large 10-tired diesel dump trucks to deliver hot mix to the spreader. At the time of this Editor's visit five 18-ton Mack trucks were hauling binder mix about seven miles. On variable hauls up to 10 miles this relatively small fleet (in numbers) was helping place as high as 10,000 lin. ft. daily of 12-ft. lane of binder course (up to 800 tons), binder being 1-in. minimum, thickening to 2 in. or more at outside edges and depressions.

The procedure was to lay about 1½ to 2 miles or a day's run on one side, then back up next day and lay the other side. Traffic was held up by flagmen at either end of the immediate work section (some 2,000 ft. in length), and vehicles permitted to go through when from 50 to 90 or so had lined up.

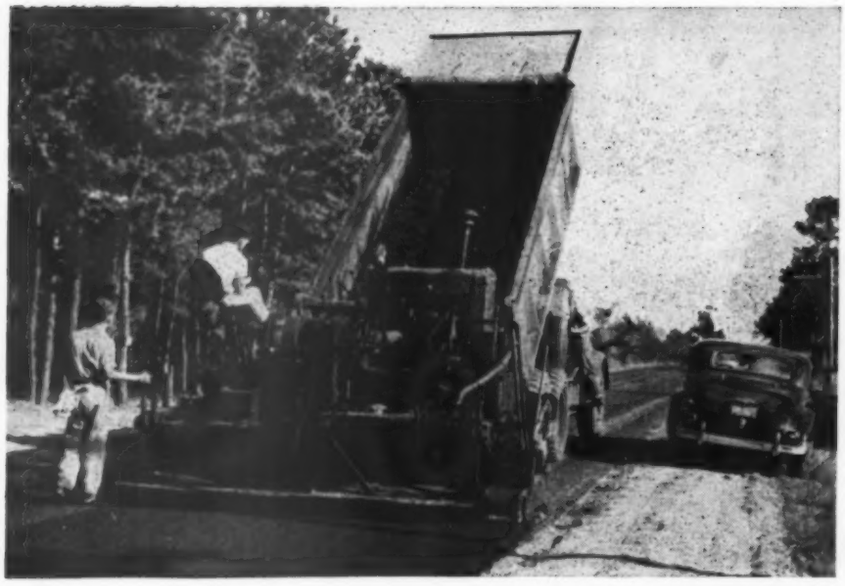
Only 19 Men

In the midst of all this traffic—which was heavily sprinkled with house trailers and long freighters—the 5-ton asphalt trucks performed with conspicuously less fuss and disturbance than would have occurred with three to five times that number of smaller trucks. Only 19 men including the truck drivers were needed on the binder crew.

Consideration had to be given to turn-around locations. This section is through swampy terrain, and shoulders are too narrow and sandy for easy turning around just anywhere. The practice whenever feasible was to pave in a direction away from the plant, so that trucks could pass the finisher with a load, back into position, then turn empty.

A word about the details of this resurface. The old 20-ft. concrete pavement along here has rendered good service for many years, and is still in pretty good shape. Breaks were patched and the slab reconstructed on either side of expansion joints. A 2-ft. widening strip was placed on either side, consisting of two 5-in. layers of limerock compacted with a trench roller and also given traffic compaction. After priming with RT2 tar the entire 24-ft. width was given a paint coat of RC1 and two hot-mix courses spread for a total minimum depth of 2 in. The

★ One of the diesel 18-tonners which simplified half-width-under-traffic placement of hot mix



★ A single finishing machine laid as high as 10,000 ft. per day

★ Putting down tack coat for day's run of binder course

★ Down she comes! Duval E. & C. Co. doesn't believe in letting rollers or other equipment sit idle. A trailer comes in handy in shuttling equipment between several black topping jobs in the Jacksonville area. Roller is a Buffalo-Springfield

binder mix consisted of 77% coarse (¾ in.) slag, 17% fines and 5% AC8 asphalt. Stone screenings were used in the surface mix.

Ordinarily the practice in Florida as elsewhere is to cover up the binder course as soon as possible. But due to the heavy traffic, which made it difficult to have two operations going at once, permission was granted for the contractor to lay binder clear through the job before beginning with the surface course.

Hot-Mix Plant

The Duval Company's hot-mix plant, located at a point 7 miles from the Jacksonville end of the project, was set up to serve several projects within hauling radius. Two different units—one for binder and surface mix Type I and one for surface course Type II—are served by the same dryer, the change-over being made in three or four hours by moving a chute. The Barber-Greene unit was not used on this road project but was set up to serve other of the Duval firm's area activities.

For binder and surface mix, the contractor's shop mechanics assembled a plant that is partly "home made." A Blaw-Knox 60-ton bin and manually operated weigh batcher feeds to an old Cummer pugmill. A shop-built rotary or puddler screen of 120 tons per hour capacity is part of this outfit. Coarse aggregates are fed into the bin by a ¾-yd. clamshell.

Stone screenings for the fine material is unloaded from box cars with a Hough loader, and material then belted into a 70-ton dust collector bin, surrounded by a tight screen for further dust protection. From the bin the dust goes via a screw up an elevator to the batch bin. In addition, there is a large dust collector located on the other side of the plant for coarse aggregate.

The Type II surface mix plant, which will utilize ½-in max. stone and dust, consists of a Barber-Greene 120-ton continuous, volumetric pro-

★ Swell for hauling workers and their hand tools—rain-protector "cab" can be lifted out of the truck bed and the truck released for other use

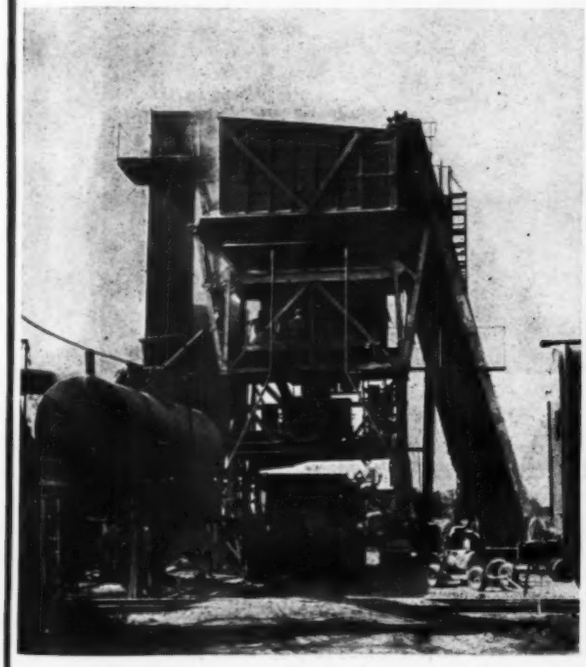
★ Large capacity storage tracks are a feature of the hot mix plant employed by the Duval Engineering & Contracting Co. on their U.S. 1 Florida work. Power plant beyond photo at right

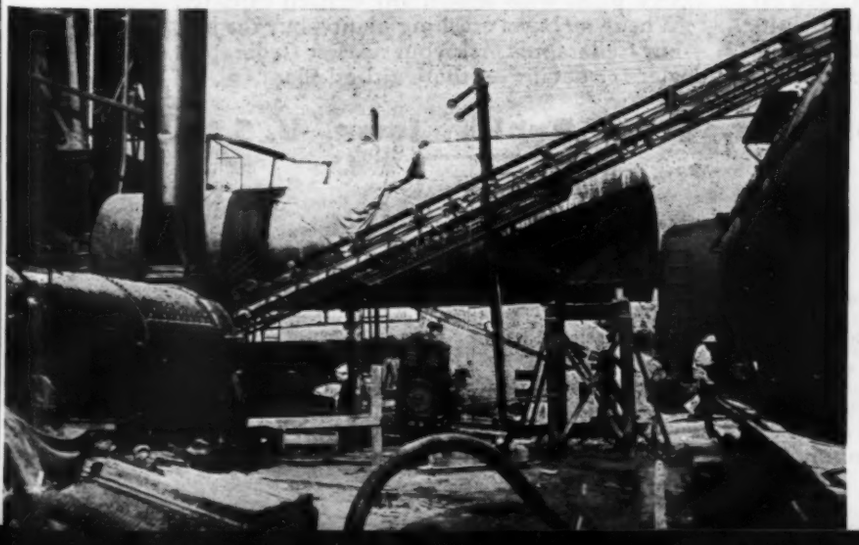
★ Binder mix feeds into 60-ton Blaw-Knox bin with 120-tons-per-hour puddler screen and thence into an old pugmill

★ An underground cable takes juice from this Caterpillar diesel D17000 power generating unit

★ Belt to the auxiliary hot mix plant. Asphalt storage tank holds 7,000 gal. In right foreground note 4-in. asphalt line which houses 1-in. steam line inside

★ Belt from stone screening car to 70-ton dust collector bin. Rubber tired cart in foreground, designed to carry the acetylene outfit, was connected from an Army Air Forces bomb carrier





Here's the answer to All your aggregate producing problems

One to six different sizes of finished products in one operation! 25 to 250 tons per hour or even more! That's the kind of production you get from a Cedarapids Unitized Plant.

Four basic units make up a complete Unitized Plant: (1) a portable primary jaw crusher; (2) a scalping unit consisting of a jaw crusher and vibrating screen; (3) a secondary unit consisting of a vibrating screen and a roll crusher, hammermill, twin jaw crusher or cone crusher; and (4) a wet or dry screening unit. These four units may be used in any combination depending upon the pit or quarry conditions and the finished products desired. For example, a primary and a hammermill secondary in a limestone quarry will produce roadstone and agricultural limestone. A scalping unit and a roll crusher secondary will produce crushed gravel in a pit where oversize is relatively small. A dozen other combinations can be set up for producing aggregate that will meet any specifications. A wide range of sizes of each unit makes it possible to have a plant with almost any desired capacity.

When you buy a crushing plant—buy the best—buy Cedarapids. Ask your nearest Cedarapids dealer for details on the Unitized Plant.

Iowa Manufacturing Company, Cedar Rapids, Iowa, U. S. A.

PRODUCT OF IOWA

Cedarapids Built by IOWA

The Iowa Line *of Material Handling Equipment Includes*

ROCK AND GRAVEL CRUSHERS	STRAIGHT LINE ROCK AND GRAVEL PLANTS	DRAG SCRAPER TANKS	PORTABLE STONE PLANTS
BELT CONVEYORS – STEEL BINS	FEEDERS – TRAPS	WASHING PLANTS	PORTABLE GRAVEL PLANTS
BUCKET ELEVATORS	PORTABLE POWER CONVEYORS	TRACTOR-CRUSHER PLANTS	REDUCTION CRUSHERS
VIBRATOR AND REVOLVING SCREENS	KUBIT IMPACT BREAKERS	STEEL TRUCKS AND TRAILERS	BATCH TYPE ASPHALT PLANTS

portioning plant. Material from the dryer is belted into this unit at right angles to the axis of the binder plant. Both units are limited in output to the 80-ton capacity of the dryer.

The Barber-Greene plant is gasoline engine driven. All equipment for binder plant is electric motor-driven, power being supplied by a Caterpillar diesel D17000 self-regulating unit, 294 amps., 220-v., 3-phase. Power is taken to the plant via a buried cable. The main service switches and master switch are located on the weighing platform. Additional switches are located in the boiler house.

The boiler, by the way, is a 180-hp. locomotive-type unit, oil fired and operating at 150-lb. pressure.

Extensive Yard Tracks

As many as six railroad tank cars can be spotted at once for heating and unloading. A 1-in. steam line, enclosed in a 4-in. asphalt line, is laid alongside the track, this arrangement assuring plenty of heat in the line and eliminating pumping troubles in spite of 300 ft. of length. An auxiliary electric power source consisting of two Koehler a.c. light plants supply two motors on the boiler fuel pumps for heating at night, and a 3-hp. electric motor-driven Kinney pump empties the cars. The AC-8 asphalt is heated to 320 deg. F.

The asphalt storage tank holds 7,000 gal. and the fuel tank 5,000 gal. Two ¾-yd. clamshell cranes, one for unloading cars and one for feeding the bins, complete the above-described layout, which by the way also includes parallel tracks on either side of aggregate stockpile space running for some 300 ft. on either side of the plant.

Other Project Details

The contract included immediate laying of stone base and black topping four lanes of divided construction along a section near the Jacksonville limits. White cement curbs and left-turn storage lanes are part of the center parkway design.

It is of interest in connection with this portion (see accompanying photo) that the soft limerock base "got away" from the contractor in spots during heavy rains—a common occurrence in Florida. The contractor hurriedly sent a distributor out with emulsified asphalt and shot the base in the rain, in a partially successful effort to provide some stabilization or waterproofing. But a considerable area of base had to be re-scarified and rolled and subjected to a second period of traffic compaction before covering.

★ Near Jacksonville city limits the contract called for construction of both sides of the ultimate four-lane divided roadway, with raised center parkway and inside storage lanes for left turns

★ A Koehring truck crane unloading lime rock, which was used for the two-course widening strips

The U.S. 1 project is part of an eventual development of U.S. 1 to four lanes divided for some miles south of Jacksonville. Of the 16 miles, three miles of the project is being constructed entirely from state funds; the remainder with federal aid. Total contract price $469,000.

The job is part of the extensive 1948 program of the Florida state road department, F. Elgin Bayless, chairman; E. C. DeGarmo, State highway engineer; John R. Slade, division engineer of Div. II at Lake City, in charge of construction, with John C. Lewis project engineer. Duval Engineering & Contracting Co. was represented by J. S. Hagan, Jr., superintendent, and Mr. Higgenbottom at the plant.

345 Cities Have Off-Street Parking

The International City Managers' Association reports that out of 875 cities surveyed, 345 now have one or more off-street parking lots in operation, but fewer than 20 charge drivers for parking. Sixty-five cities opened new facilities last year.

•

Meetings Ahead

Highway Research Board—Annual meeting, National Academy of Sciences Building, Washington, D. C., Dec. 1-6.

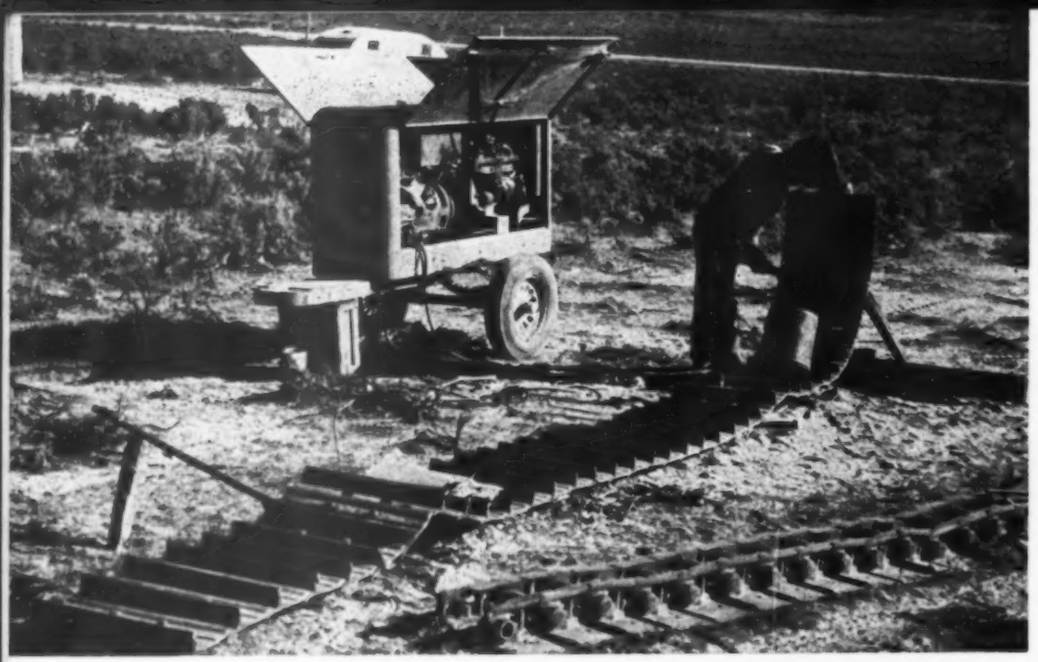
Southeastern Association of State Highway Officials, annual convention, Miami, Fla., Dec. 7-8.

National Material Handling Exposition, Cleveland, Jan. 12-16.

American Road Builders' Association—annual convention, Washington, D. C., Jan. 26-28. (1948 road show July 16-20, Soldier Field, Chicago.)

Associated General Contractors of America, Inc.—29th annual convention, Dallas, Texas, Feb. 9-12, 1948.

Associated Equipment Distributors—Annual meeting, Edgewater Beach Hotel, Chicago, Ill., Feb. 15-19.



★ Outdoor welding—building up track lugs with pieces of concrete reinforcing bar with help of handy, mobile P & H welder. Note timber frame to hold tracks to convenient height

Strong Company Rebuilds 14 Miles of U.S. 40 Nevada

MODERN aggregate production equipment and up-to-date field shop methods aided Strong Company, of Springville, Utah, on a 15-mile section of U.S. 40, Nevada, this past year. Two adjoining contracts totaling about $925,000 were involved. The work is located east and west of the town of Dunphy, which is strictly out in the sage.

U.S. 40, being one of the principal arterials to the west coast, carries considerable traffic. Reconstruction was designed to quite high standards befitting an inter-state route. The 70 mph. road design provided for 24 ft. paved width and 8 ft. oiled shoulders. One cut of 182,000 cu. yd. was required, as part of 455,000 cu. yd. total roadway excavation for the first contract of 9.08 miles. Only light grading was necessary on the second 5-mile section.

★ New grade continued in distance, with old parallel location at left serving as a detour. Nevada's policy is to surface and oil detours on main highways

★ Sheepsfoot unit drawn by Case tractor. Estimated roller time was bid as a separate item

Base Construction

In addition to relocation necessary to improve alignment, part of this project was relocated to a line closely paralleling the old road. This was done on sections involving little grading as an expedient, leaving the old road as the detour, since no alternate road existed in the area.

The fills and subgrade were compacted to 90% by Modified AASHO T99, the contractor furnishing rolling as well as water under separate bid items. Due to the heat and aridity, the 540,000 cu. yd. of roadway excavation on the two contracts required an estimated 20,000 M. gal. of water. About 6,000 hours of tamping roller service was bid by the contractor, in addition to flat roller time for compacting base material.

In designing the roadbed, soils engineers on the Nevada state highway followed latest practice running soil profiles and computing variable depth of select material base, depending on the character of the subgrade soil, drainage conditions, traffic. Base in this instance varied from 8 to 18 in. Pit-run material was used, and the contractor was allowed to add moisture at the pit as well as on the grade. Both sheepsfoot and flat rollers were employed on base compaction.

★ Looking along new grade, from top of largest cut. A single large compressor (Chi. Pneumatic) and 2 to 4 wagon drills completed this 180,000-yd. cut in 4 months' operating time

★ Light plant for the contractor's shop and camp—International 60 diesel unit

The pit-run material was topped out from shoulder to shoulder with a 3½-in. layer of crushed and screened material, dense graded from 1-in. max. This layer was flat-rolled only. A feature was the use of a spreader which formed a windrow of pre-determined height sufficient for the 3½-in. base blanket (see photo).

Surfacing consisted of 2½-in. of hot plant-mixed asphaltic concrete placed in one layer using SC-5 asphalt. The hot-mix plant was a 3,000 lb. Standard.

The contractor bid the two adjoining sections of work only a few weeks apart (July 15 and Aug. 9, '46) and thus was able to handle the entire 14 miles in a single coordinated operation. The contractor made good progress considering the fact that most of the equipment was accumulated after securing contract. The excavation was a straight job of shovel-and-truck work in rock cuts, with tractor-drawn and self-powered pans on the dirt.

★ All culvert headwall forms were assembled in the shop yard along the job and trucked to the site. Circular holes for the coated corrugated culvert pipe were cut after assembly. Power saws used throughout

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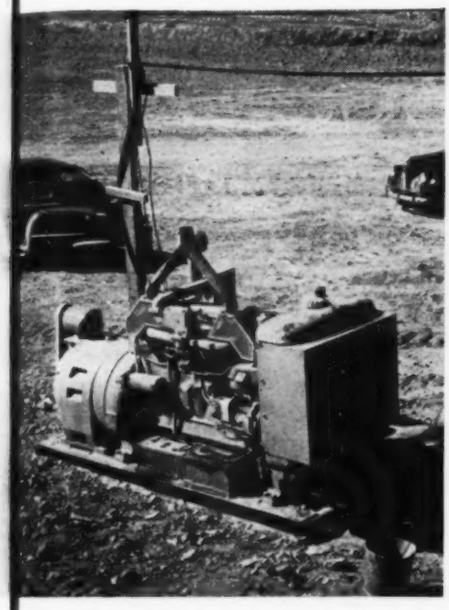


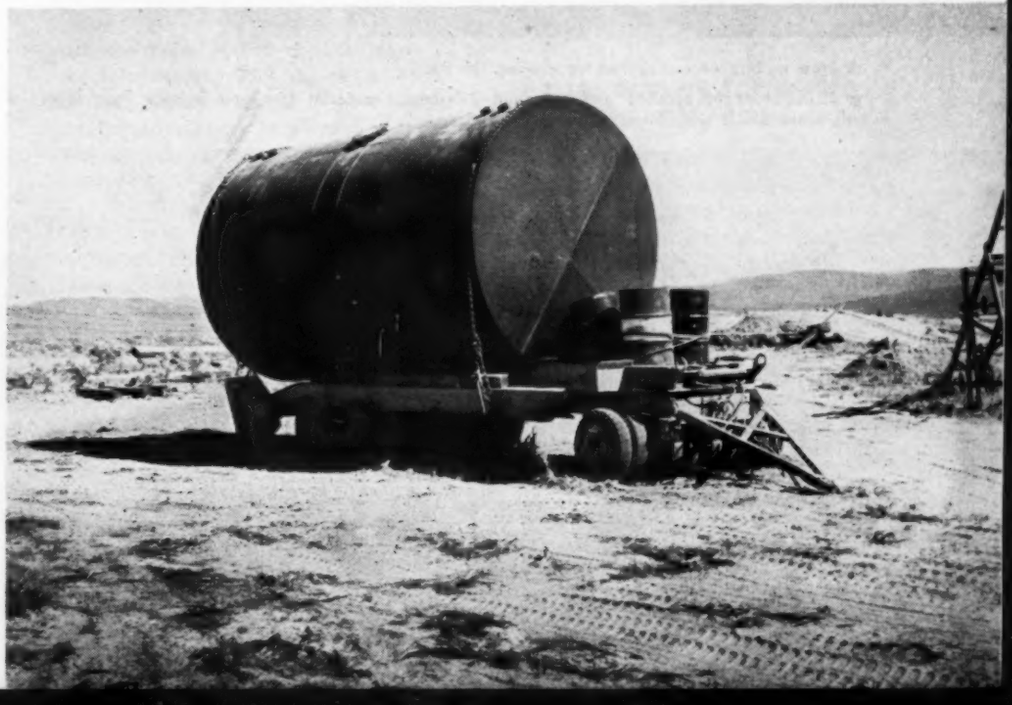
★ International gasoline-motor-powered generator, for running crushing plant belts and for lighting office car and night shift

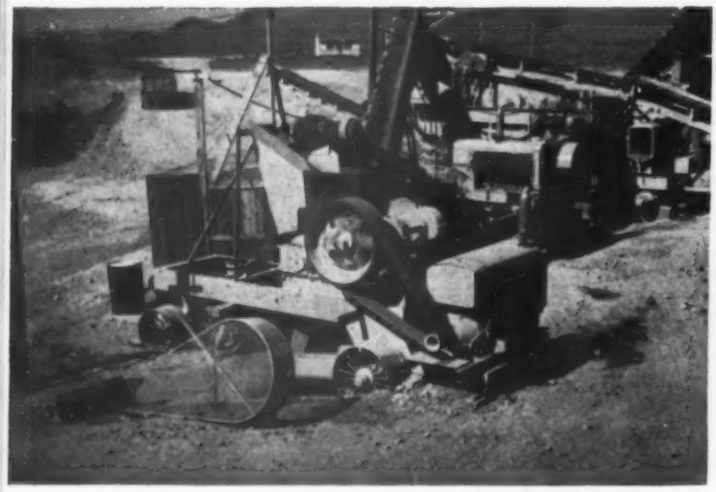
★ Detour road, consisting of a section of old alignment, being scarified, reworked and oiled to accommodate heavy traffic. A Pulvimixer with Case tractor is being put to a severe test, trying to break up and partly pulverize chunks of old road mix in cooperation with the grader

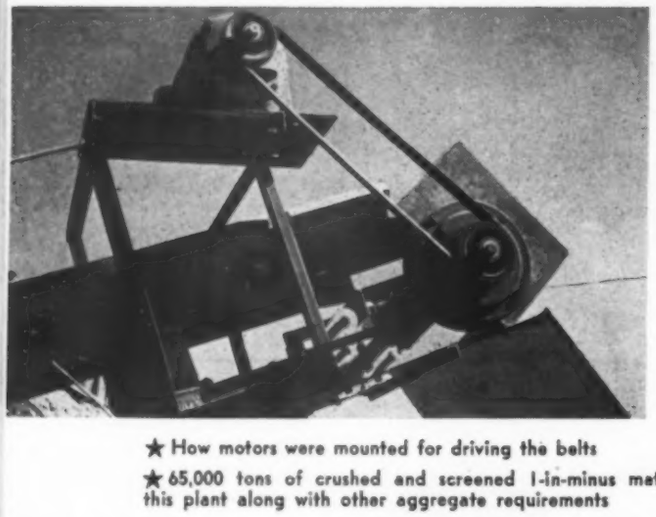
★ Crushed material for 3½-in. top layer of base was windrowed with an adjustable spreader box. 100 14-ton loads per day were being placed to make about half mile of progress

Novel Tank Trailer

★ It took 24 tires under this 6,000-gal. water tank, a vital part of Strong's outfit. Special gadget on rear of trailer is one of two heavy hinged shoes (other hidden from camera) which relieve the tires of the heavy dead load when tank is set up for use. The shoes are built onto an extension of the trailer frame. When they are dropped to position shown, with corner resting on ground, the truck is backed up slightly until the shoes swivel into upright position, raising the load several inches in the process







200-Ton-Per-Hour Crushing and Screening Plant

★ For base material, this outfit consisted of (1) a Universal primary jaw crusher, gasoline engine powered (MM Twin City) with V-belt; (2) Universal secondary roll crusher, similarly powered; (3) Pioneer washing and screening plant powered by an Allis-Chalmers gasoline motor; Barber-Greene belt units with individual electric motor and V-belt drives; and a 105-ton Blaw-Knox bin

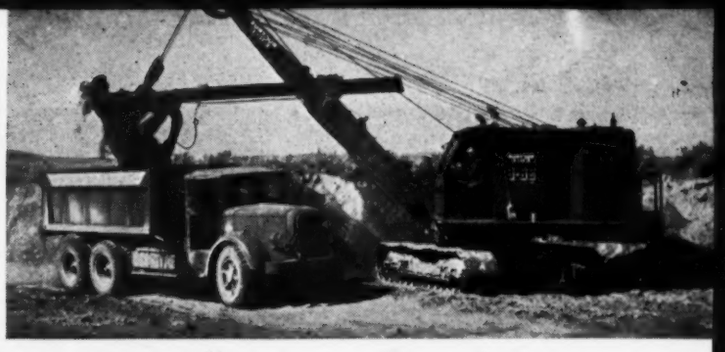
Upper left—general scene. Stockpile in foreground is for plant mix surfacing

Upper right—showing the three gasoline power units, with belt from dozer-fed receiving hopper at right, belt from primary to secondary crushing at left, and belt to bin in background

Lower left and right—additional scenes, showing V-belt drive and more details of this outfit, which consisted of portable units (some with wheels removed)

★ How motors were mounted for driving the belts

★ 65,000 tons of crushed and screened 1-in-minus material for Type 2 base (top layer) was produced at this plant along with other aggregate requirements



★ General utility truck of the Strong Company, used for handling culvert pipe and general light lifting. Consists simply of A-frame pipe boom, hoist rope frame, and power winch

★ Loading base material at pit for crusher—a Bucyrus-Erie 38-B and Mack diesel 14-yd. truck

★ Strong's modern speedy office car, stationed near the crushing plant where it can tap a line for electric lights

Base material was hauled in big trucks, using a fleet of 22 14-yd. Mack diesels purchased from Army surplus.

R. E. Eldrige was resident engineer and Bert Strong and Leo Crandell were on the job for the contractor. W. T. Holcomb is state highway engineer of Nevada. See photos for additional highlights.

Traffic Engineers Hold Most Successful Meeting

Characterized as the most successful meeting in the Institute's history, the recent annual convention of the Institute of Traffic Engineers in Detroit drew over 250 attendance and was the occasion for notable papers.

A highlight was the adoption of an all-inclusive resolution serving as a charter for professional activities of the members. In recognition of the growing traffic volumes everywhere and the rising place of traffic engineers, it was urged that members promote improved traffic control by better signals, signs and markers, more use of one-way streets, judicious channelization, and application of other tested techniques. It also took note of the need to inform and educate the public, through press and radio.

The more important discussions included a presentation by H. E. Hilts, PRA Deputy Commissioner, on the "Revised Manual on Uniform Traffic Control Devices"; a discussion of "Operating Characteristics of the Modern Automobile," by Thomas J. Carmichael, Experimental Engineer, General Motors Proving Ground; "The Business Man's Stake in the Parking Problem," by Roy John, Executive Secretary, Associated Retailers of Indiana; and a debate on the question "Are Public Subsidies Necessary to Provide Off-Street Parking Facilities?"; Affirmative, Wallace Richards, Pittsburgh Regional Planning Association; Negative, George A. Devlin, Vice-President, National Garages, Inc., Detroit.

The Institute of Traffic Engineers was organized in January, 1931, by a small group of men who recognized the value of the engineering approach in dealing with the public control and safety aspects of the highway transportation problem and who were actively engaged in the battle to reduce accidents and facilitate traffic movement. The profession has grown to a membership of nearly 400 practicing traffic engineers and technicians, and many states and municipalities are in the process of organizing Traffic Engineering Departments for the first time.

Among the outstanding developments which occurred during the past year was the appointment of a full-time Executive Secretary for the first time in the history of the organization. The Institute with headquarters at 212 Strathcona Hall, New Haven 11, Conn., is now conducting an expanding program designed towards improvement of traffic conditions on a national scale.

Newly-elected officers are: President, Robert A. Mitchell, Chief, Bureau of Traffic Engineering, City of Philadelphia; Vice-Presidents, Harry E. Neal, Chief Engineer, Division of Traffic & Safety, Ohio State Highway Department, and Wilbur S. Smith, Associate Director, Yale Bureau of Highway Traffic; and Secretary-Treasurer, Fred W. Hurd, Research Associate, Yale Bureau of Highway Traffic, New Haven.

Aerial Survey for Entire City

The city of New Rochelle, N. Y. (population 58,000) has placed a contract with the Photogrammetric Division of Lockwood, Kessler & Bartlett, Inc., Engineers, Brooklyn, N. Y., to make a complete topographic map of the entire city by aerial surveying. When the work is completed the city will have a set of topographic maps of its entire area at a scale of 200 ft. to the inch, showing 5 ft. contours, buildings, streets, parks, rivers, etc.; a single overall map at a scale of 600 ft. to the inch showing 10 ft. contours; and aerial photographs of the entire city.

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EDITORIAL

★ Don't Let Little Arguments Grow Up

Many a good construction boss has grown prematurely gray trying to keep his job "in the black" while nagged by irritating demands that he perform extra work, debatable or ambiguous under the terms of the contract.

The management of M-K is well aware that in some cases the demands are scarcely reasonable—that they are due at times to overzealous inspection, or overly ambitious youth, representing the owner—that often they would not stand the test of legality. But our policy always has been, and is, to lean far forward in interpreting liberally all the contract requirements. Our company has gone to extremes to avoid litigation and thus has built an enviable record and reputation for staying out of court.

Long experience has taught that disputes generally can be minimized by a tactful and cooperative attitude of the project manager and his supervisors on the job. The owner, whether private or public, obviously is entitled to his opinion of what he is buying. We want him always to know that, without equivocation, it is our purpose to meet every fair requirement—and as much more as necessary—to fulfill the highest standards of the contract.

Every successful contractor must put the owner's objectives first in his consideration. In the long run, the costs of all operations will compose the experience on which our estimates must be based.

Construction is by nature an impatient business, for it is keyed to the pace of human progress. But patience and tactful diplomacy are essentials of peaceful human relations that construction men must exercise —even if it sometimes hurts. Let us make every effort to adjust differences before they grow into serious disputes.

(An editorial by H. W. Morrison, President Morrison-Knudsen Company, Inc., Boise, Ida., reprinted with permission from "The Em Kayan," published by this contractor for its employes.)

★ Safety Pays Off

Clearly, the stepped-up educational program of the National Safety council is getting results. The Council's report for the first half of 1947 reveals a 9 per cent drop in highway deaths throughout the nation. The over-all tally shows 14,480 deaths as against 15,890 for the same period last year.

On the reporting cities, 256 had no traffic deaths during June and 99 had no deaths between January and July 1. With more vacationists on the road during July and August, the potential for the last half of the year is increased, but the Council is hopeful that the death rate can be held down.

The hope is not without foundation, especially when viewed in terms of the total number of states showing a drop in the fatality figure. Of the 41 states regularly reporting to the National Safety council, 27 have recorded fewer deaths for the first six months of 1947 than they did a year ago July 1. It would be difficult to assign credit for this improved situation to any one group or organization, but it is obvious that two factors must have figured prominently in putting the traffic situation "well in hand," to quote the Council report. These are: better law enforcement and better driving.

When the traffic officer and the driver join hands in the interests of safety, the combination is bound to show good results.

This kind of progress is of direct interest to highway and street engineering people, whose long range safety contribution will be felt increasingly as obsolete, inadequate and worn out roadways are replaced.

★ Brighter Rear Lights Needed

Memo to automotive industry leaders, and to transport truck and trailer makers (and owners) in particular:

Since you are all motorists yourselves, you of course realize first hand that the night driving safety problem is far from solved. Probably the most constantly recurring hazard is that of a rear-end collision with a slow vehicle. In the face of on-coming headlamps on the other side of the road, we defy you to see the tiny dim red light that is still prevailing custom for the rear of the car. Your latest models have better rear lights, but the ones we've seen still just aren't seeable enough in competition with headlights, or on rainy, foggy nights. This is especially true when one is driving with headlamps dimmed or lowered in courtesy to on-coming drivers.

Makers of big over-the-road trucks and trailers particularly need to go far beyond present standards of rear lighting.

We realize that this piece is a bit off our main beat, which is road building and maintenance. But traffic safety is the ultimate aim in road design. Perhaps this memo ought also to be addressed to the legislators who are regulating trucks down to the last windshield wiper. And to the enforcement agencies who, in many states, still permit thousands of old cars, particularly farmers', to scuttle along with no headlights at all and to all motorists who sometimes fail to keep rear lights wiped clean.

★ Improved heavy-duty combination foundation drilling rig on 35' x 100' barge, taking undisturbed samples at 150-ft. depth over deep water in San Francisco Bay; for the submarine outfall sewer line of the East Bay Municipal Utility District

Taking Soil Samples by

SOIL TUBE METHOD

California Practice Including Notes on Latest Heavy-Duty Drilling and Sampling Equipment

By O. J. Porter

O. J. Porter and Company, Sacramento, California

MOST soil explorations in California are made with a Porter type soil tube sampler. Two sizes are regularly used, (a) a heavy power operated size designed for deep borings, ranging up to 200 or 300 ft. in depth and (b) a light-weight, hand-operated outfit. Both sizes of samplers have been extensively used on Army and Navy work during the last 6 years.

The power sampler (Figs. 1 and 2) is operated with a combination drilling rig, the latest example of which is pictured.** Conventional churn drills or a heavy diamond drilling machine is used to drive and pull the sampler whenever there is more work than can be handled with the combination drill. This sampler has been successfully used for the last 14 years for obtaining undisturbed cores 2 to 4 in. in diameter.

Experience indicates that 2-in. samples are sufficiently large for satisfactory tests of compressible clay deposits. The 2-in. sampler, therefore, is normally used as it can be operated at a somewhat lower cost than the heavier equipment required for 3 and 4-in. cores.

Borings have been made to depths ranging between 60 and 300 ft., at cost ranging from $1.00 to $4.00 per ft., including rental of equipment and all operating expenses. Similar sampling with other methods usually costs two to four times this amount. Part of the lower cost results from the fact that casing is not required for borings up to 100 ft. in depth unless free flowing sand and gravel layers are encountered.

Description of Sampler

The sampler unit (Figs. 1 and 2) consists of a cutting point, five sampler sections, couplings and a plug, screw, and nut assembly. The sampler sections, couplings and the cutting points are bored out on the inside to receive brass tube sample retainers, 2 or 4 in. in length. These brass tube retainers (Fig. 3) permit ready removal of the cores from the sampler and prevent disturbance of the specimens.

The important element of this type of sampler is the plug assembly. First, it plugs the sampler until the depth is reached at which samples are desired; and, second, it provides a seal against suction immediately above the top of the sampler. The screw shaft and nut section are provided with a fast-pitch, left-hand modified Acme form threads so that the plug may be readily retracted by actuating the inside drill rods in a right hand direction. The plug is connected to the screw shaft in a manner to permit swivel action.

All sampler parts are made from high quality nickel or tool steel and connections are made with modified Acme form threads and butted joints within the couplings. The outside extensions from the sampler to the surface, consist of standard "P.K." diamond drill rods, except that the couplings are bored out sufficiently to clear the diamond drill "E" rods which are utilized as extensions from the screw shaft to the surface.

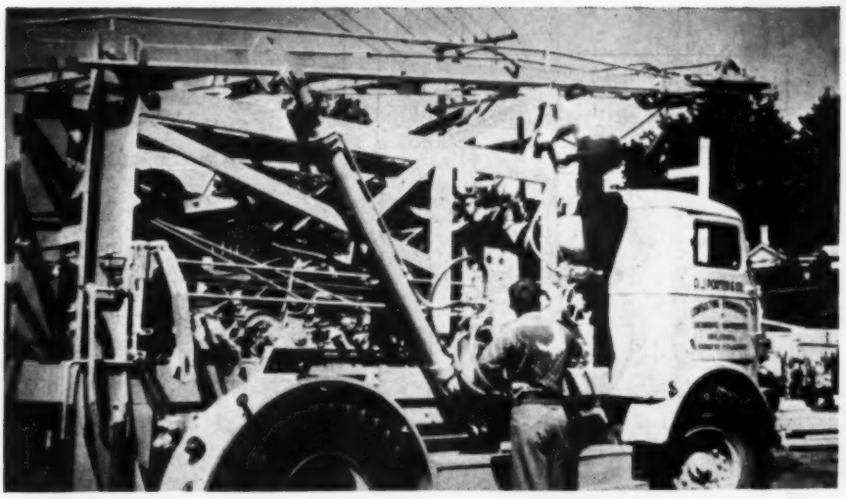
Details of Operation

Samples are taken by (1) driving the sampler, with the plug in the driving position, to the desired depth; (2)

*"An Improved Type of Soil Sampler for Exploration of Soil Conditions and Sampling Operations," by Thos. E. Stanton, Jr., Proceedings of the International Conference on Soil Mechanics and Foundation Engineering, Harvard University, Vol. 1, Page 13, June, 1936.

**"Drilling Cost Cut by New Rig for Foundation Investigations," by O. J. Porter, "California Highways & Public Works," Sept., 1937.

★ Improved Combination Foundation Drilling Rig ready for moving. Includes high-pressure hydraulic equipment and jacks for quickly and safely raising and lowering derrick. Hydraulic equipment also designed for forcing the sampler into the ground or extracting, and will exert 20,000 lb. force in either direction. Derrick raised or lowered any position, to fraction of an inch. From 45 to 60 min. saving claimed per set-up, over conventional equipment having only cable and gravity controls for derrick



★

Improved Heavy Duty Drill Rig

Virtually a complete subsurface exploration outfit on a single truck, is an appropriate description of the drill rig shown. Designed and built under the supervision of O. J. Porter, consulting engineer, Sacramento, this unit, mounted on an FWD cab-over-engine truck, can perform any of the following:

1. Take undisturbed soil samples by the new technique of a continuous hydraulically operated push on the sampler.
2. Churn-drill holes when necessary to penetrate rock strata or boulders.
3. Take core samples (only partially disturbed) loose material, such as slides, etc.
4. Drill Caltex holes in rock up to 30 in. diameter—for major investigation for dam foundations.
5. Make rotary borings up to 36-in. diam. in clay and other soil.
6. Provide a high-speed rotary table for oil-well-type rotary bits when desired—all types of known drilling and exploration except diamond drilling.
7. Can drive piles and build own trestle support as it proceeds across marshy ground or river channels.
8. Make major load tests for airfield design, using hydraulic controls to supply the necessary weight concentration.

An 85-hp. Ford V-8 engine supplies power for the various operations. This engine provides 4 speeds to the primary movement, 3 speeds on the hoist—or 12 combinations; also 2 speeds on the rotary, thus permitting a choice of 8 rotary speeds. The boom is raised or lowered hydraulically.

The specially assembled mechanism includes a Keystone drilling head or derrick, a spudding beam for churn drilling and driving, a sampling beam with hammer taken from a Bucyrus-Armstrong outfit, derrick of special 35-ton design, Hyster double-truck crane hoist.

An outfit similar to this is in service on U. S. Navy project in the Pacific.

★ Samples being taken with the Porter Sampler through a 6-in. casing which extends a short distance into the mud. Drilling operations carried on from working platform, suspended out from barge

★ Driving the Porter piston-type sampler in obtaining undisturbed sample from 153-ft. depth, San Francisco Bay. Drill outfit and derrick designed to pull up to 30 tons, which makes it possible to rapidly extract the sampler from without casing entire hole

★ Drill outfit ready to take a 2" x 3' sample. Sampler being driven with a 500-lb. steel slipover hammer, actuated with spudding beam of drilling rig. Sample can also be taken in one continuous operation of penertating by utilizing hydraulic reaction

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Thor Sinker Rock Drill
(Model 75—Heavy Duty)

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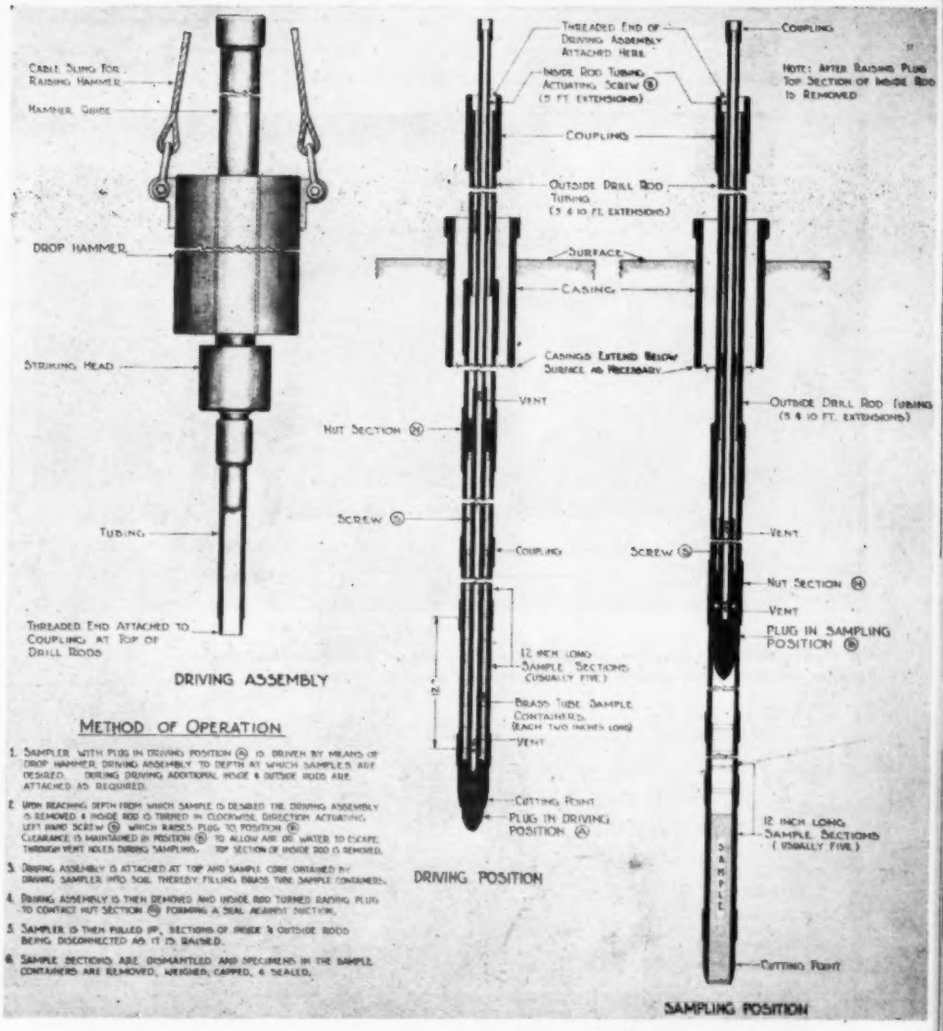

CABLE SLING FOR RAISING HAMMER
HAMMER GUIDE
DROP HAMMER
STRIKING HEAD
TUBING
THREADED END ATTACHED TO COUPLING AT TOP OF DRILL RODS
DRIVING ASSEMBLY
METHOD OF OPERATION
1. SAMPLER WITH PLUG IN DRIVING POSITION (A) IS DRIVEN BY MEANS OF DROP HAMMER, DRIVING ASSEMBLY TO DEPTH AT WHICH SAMPLES ARE DESIRED. DURING DRIVING ADDITIONAL INSIDE & OUTSIDE RODS ARE ATTACHED AS REQUIRED.
2. UPON REACHING DEPTH FROM WHICH SAMPLE IS DESIRED THE DRIVING ASSEMBLY IS REMOVED & INSIDE ROD IS TURNED IN CLOCKWISE DIRECTION ACTUATING LEFT HAND SCREW (S) WHICH RAISES PLUG TO POSITION (B). CLEARANCE IS MAINTAINED IN POSITION (B) TO ALLOW AIR OR WATER TO ESCAPE THROUGH VENT HOLES DURING SAMPLING. TOP SECTION OF INSIDE ROD IS REMOVED.
3. DRIVING ASSEMBLY IS ATTACHED AT TOP AND SAMPLE CORE OBTAINED BY DRIVING SAMPLER INTO SOIL THEREBY FILLING BRASS TUBE SAMPLE CONTAINERS.
4. DRIVING ASSEMBLY IS THEN REMOVED AND INSIDE ROD TURNED RAISING PLUG TO CONTACT NUT SECTION (H) FORMING A SEAL AGAINST SUCTION.
5. SAMPLER IS THEN PULLED UP, SECTIONS OF INSIDE & OUTSIDE RODS BEING DISCONNECTED AS IT IS RAISED.
6. SAMPLE SECTIONS ARE DISMANTLED AND SPECIMENS IN THE SAMPLE CONTAINERS ARE REMOVED, WEIGHED, CAPPED, & SEALED.
THREADED END OF DRIVING ASSEMBLY ATTACHED HERE
INSIDE ROD TUBING ACTUATING SCREW (S) (5 FT. EXTENSIONS)
COUPLING
OUTSIDE DRILL ROD TUBING (5 & 10 FT. EXTENSIONS)
SURFACE
CASING
CASINGS EXTEND BELOW SURFACE AS NECESSARY
VENT
NUT SECTION (H)
SCREW (S)
COUPLING
12 INCH LONG SAMPLE SECTIONS (USUALLY FIVE)
BRASS TUBE SAMPLE CONTAINERS (EACH TWO INCHES LONG)
VENT
CUTTING POINT
PLUG IN DRIVING POSITION (A)
DRIVING POSITION
COUPLING
NOTE: AFTER RAISING PLUG TOP SECTION OF INSIDE ROD IS REMOVED
OUTSIDE DRILL ROD TUBING (5 & 10 FT. EXTENSIONS)
SCREW (S)
VENT
NUT SECTION (H)
VENT
PLUG IN SAMPLING POSITION (B)
12 INCH LONG SAMPLE SECTIONS (USUALLY FIVE)
SAMPLE
CUTTING POINT
SAMPLING POSITION

★ Fig. 1—Diagrammatic sketch of Porter type sampler

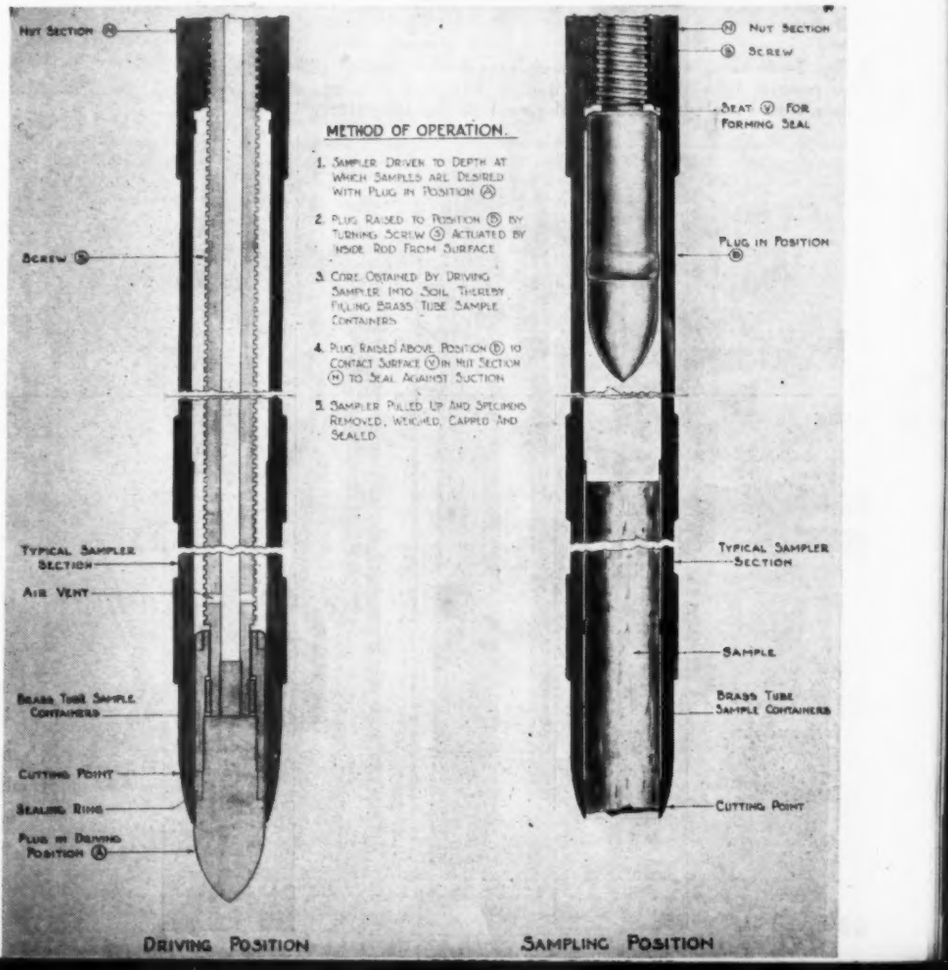
retracting the plug and then driving the open sampler into undisturbed material; (3) retracting the plug further to effect an airtight seal above the sample; (4) rotating the outside drill rods in a right-hand direction to shear off the soil at the bottom of the cutting point; and (5) withdrawing the entire sampler unit to the surface.

The string of 2-in. brass sample retainers, with the contained samples, are pushed out of the sampler sections, immediately following removal from the hole, cut into sections at the joints between the retainers with a fine piano wire saw, and then capped and weighed. The unit weight of the cores, together with the examination of the cut surface and the resistance to penetration as determined from the driving record, furnishes an immediate index in the field, as to the uniformity and character of the material. Specimens retained for shipment to the laboratory are at once taped, marked and sealed with paraffin in order to prevent any change in the original condition.

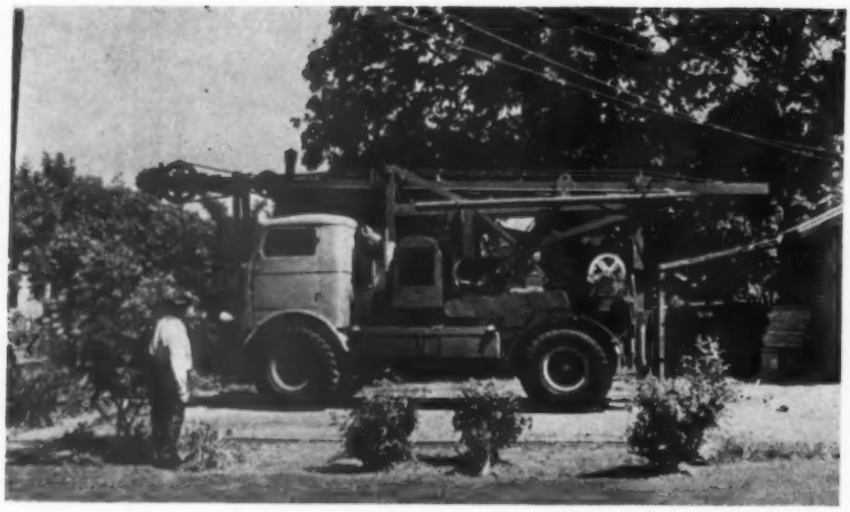
A 3 to 4-ft. length of soil core is normally obtained in one sampling operation. When necessary, practically continuous cores can be secured by driving the plugged sampler to the lower elevation of the previous sample before retracting the plug. On important work one core 3 to 4 ft. in length is usually taken for each 5 ft. of depth. In many cases, however, the driving record furnishes sufficient information regarding the uniformity of the material so that drilling operations can be expedited by taking test samples at less frequent intervals.

Casing is required only when the skin friction becomes too great to permit ready driving and pulling of the sampler. The casing, when necessary, is sunk by jetting or churn drilling methods, to the depth previously sampled. Sampling is then continued below the casing in the usual manner.

When information regarding the probable stability of slopes is required in connection with large cuts through alternate layers of sandstone and soft shale, continuous samples are taken until a hard stratum is encountered. A churn drill is then used through the hard stratum until another soft layer is encountered, after which the tube sampler is again used to secure cores of the questionable material. Thus by alternately sampling and churn drill-

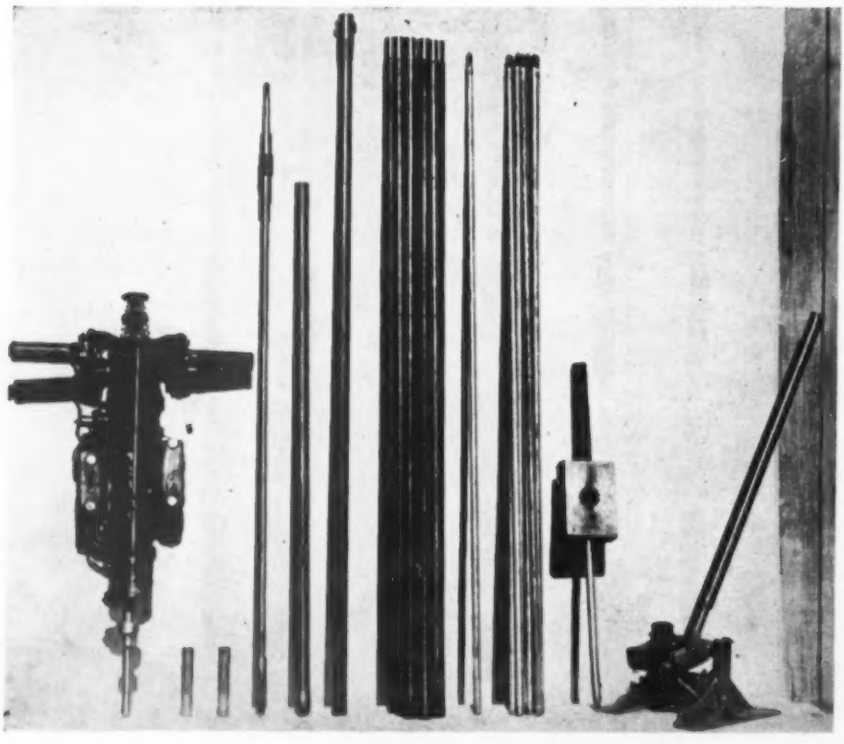

NUT SECTION (H)
SCREW (S)
TYPICAL SAMPLER SECTION
AIR VENT
BRASS TUBE SAMPLE CONTAINERS
CUTTING POINT
SEALING RING
PLUG IN DRIVING POSITION (A)
METHOD OF OPERATION.
1. SAMPLER DRIVEN TO DEPTH AT WHICH SAMPLES ARE DESIRED WITH PLUG IN POSITION (A)
2. PLUG RAISED TO POSITION (B) BY TURNING SCREW (S) ACTUATED BY INSIDE ROD FROM SURFACE
3. CORE OBTAINED BY DRIVING SAMPLER INTO SOIL THEREBY FILLING BRASS TUBE SAMPLE CONTAINERS
4. PLUG RAISED ABOVE POSITION (B) TO CONTACT SURFACE (V) IN NUT SECTION (H) TO SEAL AGAINST SUCTION
5. SAMPLER PULLED UP AND SPECIMENS REMOVED, WEIGHED, CAPPED AND SEALED
DRIVING POSITION
(H) NUT SECTION
(S) SCREW
SEAT (V) FOR FORMING SEAL
PLUG IN POSITION (B)
TYPICAL SAMPLER SECTION
SAMPLE
BRASS TUBE SAMPLE CONTAINERS
CUTTING POINT
SAMPLING POSITION

★ Fig. 2—Details of sampler



★ Heavy duty combination foundation drilling rig as it looked near completion—boom down and ready for traveling over the road

★ Fig. 3—Showing caps, empty sample container, typical soil specimen after removal from the container, typical 2-in. and 4-in. containers, and sample sealed and prepared for shipment to the laboratory



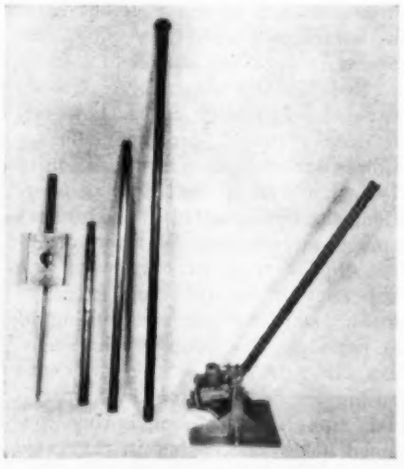
ing, accurate advance information has been obtained at the site of proposed cuts ranging up to 100 ft. or more in depth.

Hand Sampler

The hand-operated sampler is used in connection with routine preliminary soil surveys for both highway and bridge projects. The holes are put down in all cases without casing, and cores approximating 1 in. in diameter are obtained from penetrable ground to depths of 40 and 70 ft. About 20 outfits of this size are in constant use throughout California.

In most cases when investigating bridge foundations the field crews are usually able to obtain sufficient information with this 1-in. sampler. The driving record, when correlated with the moisture content, unit weight, and character of the soil usually indicates whether piles are necessary and the probable length required. When the hand borings disclose difficult foundation conditions, a complete investigation can readily be made with the larger equipment, if desired.

Fig. 4 shows the 1-in. sampler, extension rods and miscellaneous equipment required for making hand borings to a depth of 50 ft. The equipment is operated similar to the larger sampler except that a hand-operated drop hammer or a portable explosive hammer is used to drive the sampler.



★ Fig. 5—Soil tube sampler for boring to a depth of 8 ft. Left to right: Drop hammer, two and 3-ft. extension rods, Sampler with cutting point and driving head, and lever type jack for pulling sampler from ground

★ Fig. 4—One-in. Porter sampler and equipment for making hand borings to a depth of 50 ft. Left to right: gasoline hammer, two 6-in. sample retainers, plug and nut assembly, sampler with cutting point, ten 5-ft. outside extension rods, ten inside extension rods, drop hammer, and jack with pulling grip

STATE OF CALIFORNIA—DIVISION OF HIGHWAYS
MATERIALS and RESEARCH DEPT.
BORING RECORD

DIST. IV CO. Napa RT. 7 SEC. H STA. 572+00
LINE A FT. Right-Left 10 CONT. NO. Prel. S.A. E.W.O. #256

OPERATING CREWS

CONTRACTOR'S	ON	OFF	STATE	ON	OFF
			C.M.S.	8⁰⁰	4³⁰
			H.L.F.	"	"
			G.B.C.	"	"

SAMPLING DATA

Sample No.	Sampler	Time Record: Start Down	Raise Plug	Driving Comp'd	Sample Out	Elevation Data: Overall Length	Stick Up	Depth	Elev.	Retained Sample: Elev.	No. Retained Brass	Jars
D	Cl.	10⁰⁰				26' 0"	0"	26'	413		5	2
	Op.		10²⁵	10²⁵	10³⁵	31' 8"	2"	29' 8"	410		Length Core	36"
E	Cl.	10⁵⁰				31' 8"	2"	29' 8"	440		6	1
	Op.		11⁰⁰	11⁰⁰	11²⁰	36' 2"	4"	32' 2"	407		Length Core	36"
F	Cl.	11³⁰				36' 2"	2"	34' 10"	405		3	1
	Op.		11⁴⁵	12⁰⁰	12²⁰	36' 2"	0"	36' 2"	403		Length Core	24"

Weather Clear
Temp. Warm

REMARKS

Elev. of Water in Hole Dry

8⁰⁰ to 12⁰⁰ Sampling
12⁰⁰ to 12³⁰ Lunch
12³⁰ to 1⁰⁰ Sampling
1⁰⁰ to 2⁰⁰ Moving to Boring #3

Legend:
J = Cores removed from brass tube retainers and saved as a jar sample for moisture content and grain size tests.
I, II, III etc. Numbers - Tubes, saved, sealed, and shipped to Laboratory for testing.

Contractor _____ Inspector J.W.

HOURS SPENT TODAY IN:

Sampling	Drilling	Casing	Moving	Repairing

Contractor's Pay Time: Today _____ To Date _____

Form T-35
16M 6-38

ELEV. Reference 439 Surface 439 Op. Bor. _____
Dia. Sampler 2" Wt. Hammer 450 Today's Sheet No. 2
Page No. 12 Boring No. 2 Date 2-14-39

Depth	ELEV.		Tube	Wt. Per Cu. Ft.	Driv. Rec. Blows Per Ft.	Driv. Rec. Length of Drop	LOG OF MATERIAL
26	413					18"	
			V	93	6		Plastic clay
27	412		J				Old slide material
		2-D	IV	91	8		
			III	92			← Change: Probable
28	411		J				surface of old ground
			II	96			Brown clayey
			I	95	12		topsoil. Roots and
29	410		J				vegetation.
			IV	94	14		
			V	96			← Change:
30	409		IV	117			
			III	118	48		
		2-E	J				
31	408		II	116	52		Stiff brown
			I	115			Clay.
32	407				48		Plug closed
					50		
34	405						← Change:
			J				
			IV	126	260		
35	404	2-F	II	125			Damp brown
			J		325		bedded shale.
36	403		I	127			
							Bottom of Boring

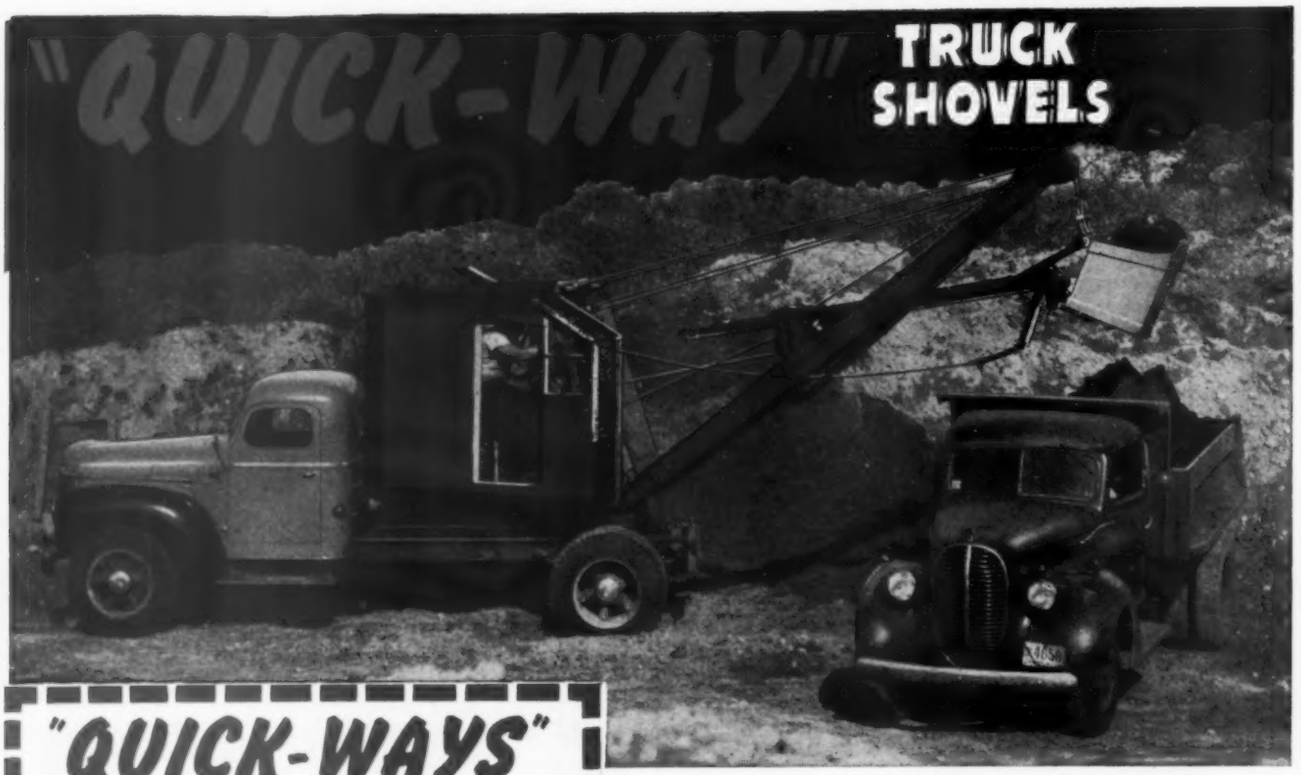
★ Fig. 6—Report record of California division of highways

The 1-in. Porter sampler consists of cutting points, sampler tube, outside extension rods, driving rod and plug, nut section, inside extension rods, driving head, hammer and a jack with pulling grip. Brass tube sample retainers fitting the inside of the sampler tube are included to receive and hold the soil cores. The cutting points are made of tool or other high quality steel, heat treated and drawn to provide a hard, tough, cutting edge which will withstand severe use. The driving heads and driving rods and plugs are also made of high quality alloy steel. The outside extension rods are made of cold drawn and annealed seamless nickel alloy tubing, 1¼-in. outside and 1.01-in. inside diameter. The inside extension rods are made of ⅝-in. pipe with suitable inside couplings providing a smooth connection at the joints. The sample retainers are made of brass tubing, 1 in. O.D. by 0.936 in. I.D. (21 Stubbs Gage) and are cut into 6-in. lengths for use in the sample tube. Copper caps fitting over each end of the sample retainers are provided to seal the

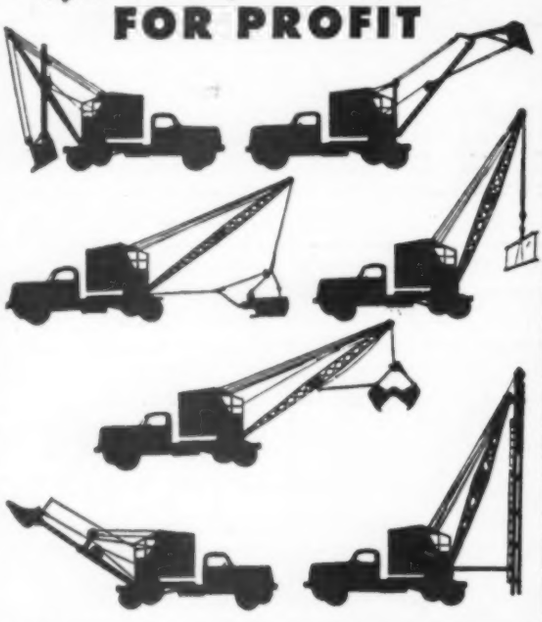
(*Continued on page* 85)

LOCATION RONNE SANITARIUM BUILDING PROJECT 39-47 BORING NO. H3
STA. 3+50 5 FEET, Right ← C LINE DATE DRILLED 6-1-47 SHEET NO. 1 OF 1

DIST. FROM SURF.	ELEV.		TUBE No.	BLOWS PER FOOT	WEIGHT PER CU. FT.	MOISTURE % DRY WEIGHT	LOG OF MATERIAL
0	+75			5			← GROUND LEVEL
1				6			
2				10			↕ ← 1 SPACE = 1 FOOT - DRIVING CLOSED
3	72						1 SPACE = 6 INCHES - DRIVING OPEN
			IV	19	119	20	
4			III		120	18	SAMPLE RETAINED (CORE LENGTH)
		3	II	24	118	22	
5			I	26	121	18	DISTANCE SAMPLER DRIVEN OPEN
6	69						
7				16			
8	67			18			
				24			← SYMBOL - SAMPLE DISCARDED
9			B				
		2	III	27	124		← ARROW FOR CHANGE OF MATERIAL
10			A				
		3	II	89	121		← LETTER - JAR SAVED
11	64		I				← ROMAN NUMERAL - TUBE SAVED
12			J		SYMBOL FOR JETTING		
13			E				LOG OF MATERIAL SHOULD INCLUDE:
14	61		T				
				16			A COLOR IE: MOTTLED BROWN, ETC.
15							B STRUCTURE IE: LAMINATED, ETC.
		3	III		130	12	C MOISTURE CONTENT: GRADING FROM
16			II	36	128	14	SATURATED TO DRY
			I	62	132	13	D CONSISTENCY IE: FRIABLE,
17	58						PLASTIC (1/8"), ETC.
18				45			E TEXTURE - GRAIN SIZE AND SHAPE IE:
19				43			COARSE SANDY GRAVEL (SUB-
20				40			ROUNDED PEBBLES 1/2" - 1 1/2" DIA.)
21				42			F OTHER PERTINENT PHYSICAL
22	53			46			CHARACTERISTICS - ALSO
				58			MINERAL COMPOSITION
23			A				IF POSSIBLE
		4	II	61	133	13	
24		3	I	87	132	14	BROWN SATURATED CLEAN MEDIUM
25	50				141	9	FINE SAND
26	49		A	94			← CHANGE
			II	139	141	9	GRAY BEDDED (DIP 10°) INDURATED
27		5	I		143	8	SILTY SHALE
		3		250	146	8	
28	+47						



"QUICK-WAYS" FOR PROFIT



One of the easiest ways to increase profits is to cut costs . . . and *"QUICK-WAYS"* offer you not one but *seven* ways to do it.

- **CONVERTIBILITY:** Any *"QUICK-WAY"* is convertible *in minutes* from shovel to dragline, clamshell, crane, trench-hoe, pile driver or speed loader.
- **PORTABILITY:** Travels on or off the road at truck speed . . . More hours of productive work.
- **FAST OPERATION:** Fast hoist and swing action mean more material moved per man hour.
- **INTERCHANGEABILITY:** Many parts interchangeable . . . easy adjustment and repair.
- **COST:** Low initial investment, low maintenance.

All these advantages of this ruggedly built equipment add up to greater profits anywhere you put a *"QUICK-WAY"* on a job. There's a *"QUICK-WAY"* owner near you: ask HIM.

Model E: 4/10 cu. yd. cap. for mounting on any standard 5-ton truck.

Model J: 1/4 cu. yd. cap. for mounting on any standard 1½-ton truck.

Service available from Distributors strategically located in U.S. and worldwide

For speed, portability, economy of operation, and adaptability to a wider range of jobs, nothing of comparable size equals a "Quick-Way" Truck Shovel.

"QUICK-WAY" TRUCK SHOVEL CO.

DENVER, COLORADO

First to build power shovels for truck mounting; still the leader after 28 years

APWA Maps Membership Expansion

Serious "round table" discussions mark well-attended 53rd annual Public Works Congress. J. W. Morgan, Birmingham, elected president for 1948

CITY engineering and public works leaders are wrestling with a bewildering number of problems these days, as urban populations burst their seams and city dwellers think up new demands for public service. Because of the diversity of the problems—ranging from garbage disposal to airfield planning—most of the time at the American Public Works Associations Jacksonville meeting (Oct. 5-8) was devoted to specialized group meetings.

At the close of the convention J. W. Morgan, commissioner of public improvements, Birmingham, Ala., was chosen to succeed Samuel S. Baxter of Philadelphia as association president.

Vice-presidents for 1947-8 are William A. Xanten, Washington, D. C. (formerly treasurer); Walter N. Frickstad, Oakland, Calif. (re-elected); and E. J. Cleary, *Engineering News-Record*, New York (re-elected).

Glenn C. Richards, Detroit, became treasurer. W. O. Jones, Fort Worth, was re-elected a director and Allan H. Rogers, Garden City, L. I., was added to the board.

In the closing session president-elect Morgan announced a goal of 1,000 new association members in 1948, the present membership numbering 1,335. The association, according to a report by executive director Donald F. Herrick, now is represented by ranking officials in from 57% to 73% of the cities in various population brackets of 75,000 upward. A somewhat lesser representation exists from smaller communities. (ROADS AND STREETS readers who are public works officials or department heads and who are interested in applying for membership should write: American Public Works Association, 1313 E. 60th St., Chicago 37, Illinois. —Editor.)

Need for Training

Need for systematic training of new personnel for municipal service was stressed by Robert L. Anderson, Winnetka, Ill. In a talk before the general session he said:

"With all the unfavorable circumstances to which public service is now inherently subject, it is only by special effort that we can induce young men of high ability and promise to undertake and continue careers in our field. Such a program is important to improvement of the professional status and standards of public service."

J. W. Morgan

Anderson outlined practical teaching methods, which include:

Demonstration—a basic training tool.

Group conferences for exchange of experiences and for engendering enthusiam and setting courses of action.

Encouragement for employees to attend short courses given by other organizations. Detroit, for example, offers a 6-weeks institute for vehicle operators.

Individual instruction, including correspondence courses (for smaller cities, especially).

Supervised research and reading; library services; educational films.

Field trips to visit projects.

Formal plans for training in specific skills, with labor union cooperation at times.

On-the-job individual instruction, by foremen or experienced workers—one of most common means of instruction today.

Other training suggestions include rotation of assignments, systematic interchange of technical papers and periodicals among employees. Anderson specially pointed to the value of manuals of procedure as means of breaking in new employees, and of the importance of using the right psychological appeal in imposing training programs. Appointment of administrative assistants, chosen as understudies for executive posts, is particularly important in larger city organizations. The public works official owes it to his public to make use of the best modern personnel practice.

In discussing Anderson's paper, George Thompson, city engineer of Detroit, reminded that there are other factors than training, the recruiting of qualified young men in spite of salary handicaps being one obstacle at present.

Financing Home Areas

Also speaking before a general session, H. Everett Kincaid, executive director, Chicago Plan Commission, discussed the financing of public improvements in new residential areas. The better real estate firms are not averse to paying for the public utility extensions needed, he said. With the large inroads of the states on city tax revenue sources, he foresees that future improvements will be financed largely out of revenue bonds.

As an example, Kincaid took the case of a 160-acre suburban home development, a fully approved, well planned project near existing facilities. Sewer and water extensions would be financed with revenue bonds, the city bearing the cost of installation. The developer would pro-rate the expense per lot, and pay 100% immediately for lots expected to remain vacant, being reimbursed later by the home buyer. Phone and light facilities will be installed by the utilities. Grading, paving, walks, etc., will be put in by the developer, with local bank backing if necessary. A total of $600 to $700 per 50 or 60 ft. lot would probably be required,

this cost included in the purchase and financing of the home by the buyer. An acceptable lighting system (financed not from general city tax funds, but by the developer) will cost about $110 per family. Figuring land at $1,000 per acre, the total sale price of the lot would be say $1300 to $1500, which will include $250 for the land, $800 for improvements, $25 for prorata share of land set aside by the developer for a future school, $10 to $25 for planning and engineering, and $250 builder's profit.

Snow Removal Methods

The needs of under-50,000 cities in their snow removal programs was the topic at one luncheon meeting, with Leland R. Gare, Ecorse, Mich., chairman. As with some of the other committee meetings at Jacksonville, this one suffered from lack of a planned topic and prepared statements.

Diversity of opinion was revealed on the wisdom of depending on light trucks for snow clearance. They're OK, said one delegate, if you can always get started with the storm and run two or more trucks with one-way or V-plows in tandem, without stopping even for coffee until the emergency is over. A 10-in. snowfall, said another, requires at least a truck of 40,000-lb. gross weight. Other random tid-bits: Under-frame attachments for plows are hard on light trucks . . . 2½-ton or heavier trucks with four-wheel-drive are needed in Massachusetts . . . even in light snow areas, each plow route tends to have a hill or other tight spot requiring a real push.

The growing dependence on power loaders for cleaning up downtown areas, intersections, etc., was noted. One mobile force feed loader capable of filling 5 to 10 cu. yd. of snow per minute into trucks was described.

The great variety of methods used to plow sidewalks and streets, described by the various delegates, served to emphasize the fact that no two winters are alike, and no two cities have quite the same conditions and needs. Hence, practice also varies widely. One city, for example, sends a blade grader out first, followed by two plows when the going gets heavier. Other cities use graders very little. Smaller communities will continue to put considerable dependence on graders, it was agreed, since this is an all-around machine. One city plows to center of its wide business street, and then picks up with a loader; another avoids this practice, due to the hazard of a sudden thaw attended by cross drainage to gutters.

Again, one city prohibits property owners from shoveling walks, while others try to force owners to do so.

The problem of how to plow the narrow 4 and 5 ft. walks now advocated by economy minded planners found no solution, most sidewalk plows being too wide. What to do in plowing walks around parking meters also was recognized as a problem, as is the perennial one of whether to open up private driveways or let owners shovel their own way out.

The Association's committee on snow removal is working toward a recommended standard method of reporting performance data on equipment. This report form would give data from which unit costs could be compiled if desired.

APWA Veterans' Award certificates for long, continuous and outstanding service to a community, were made this year to Thomas L. Heaver, superintendent of streets, Salem, Mass., and to Herbert Scott Smith, superintendent of public works, Waterbury, Conn.

New Techniques and Equipment

Harold F. Barrows, director of research, Austin-Western Co., Aurora, gave a resumé of new trends in materials and methods for municipal work. Gathered with the aid of publication editors, this talk highlighted the fact that there is a tendency toward tighter asphalt paving specifications, with greater use of three-axle rollers to meet closer tolerances on surface smothness. New mechanical equipment for speeding up pavement hole drilling in connection with mud-pumping was mentioned. A city must be able to work its equipment a certain percentage of the time in order to justify its purchase. Manufacturers are making every effort to develop multiple-purpose equipment for city work. More attachments on standard equipment is a definite trend.

Mentioned in the discussion was the use of a motor grader and loader with extra wide blades, for widening, trenching, etc.; and the need for street sweepers that will load refuse into trucks without hand shoveling or need for a separate machine. Also need for a ditcher for use in restricted places (low headroom). A new leaf loader excited some comment.

But generally it was agreed that whereas road contractors are turning toward larger and heavier specialty equipment, the average municipality in general will continue to depend more on small, versatile units.

George Thompson of Detroit and several material representatives summarized material trends. Among the pavement refinements noted by L. M. Arms, Portland Cement Association, is the wider spacing of expansion joints, use of pre-stressed concrete for pipe and culverts, establishment of air entraining concrete as standard for pavements in northern areas where de-icing chemicals are used, and a new technique for cement-shooting pipe joints so that they are as strong as the pipe itself. W. T. Adams, Armco Drainage and Metal Products, Inc., traced the use of corrugated pipe for underdrains, storm sewers and sanitary sewers and use of spiral welded pipe for pile casings and other construction uses. Multiple-plate construction, development of pipe arches, and the 20-year service record of asbestos bonded bituminous coated pipe having a paved invert was outlined.

Management Techniques Needed

A notable paper was that of Stanley I. Pinel, consulting engineer, Chicago (Griffenhagen & Associates). He noted that cities have been charged, possibly correctly, with failure to keep pace in their governments with rapidly changing civic needs, as compared with privately owned utilities. He counseled city administrators to look oftener into management techniques that might improve efficiency. A separate service division under the public works department was suggested as a means of handling cost accounting, cost control, equipment control and certain other functions for the street, sewer or other operating divisions of the department. He advocated centralization of maintenance of all municipally owned equipment under the director of public works. Simplification of foremen's daily and weekly records was touched on, together with the value of modern business machines, with the warning that records can be over-simplified and that experimentation in this field is needed.

Street Design Details

Under Frederick T. Paul, city engineer, Minneapolis, one round table luncheon meeting was devoted to street construction and layout.

Street and lane widths came in for much discussion. One delegate knocked the tendency of plan officials who lack practical experience to lay out residential streets only 24 ft. wide, which is not enough for refuse trucks, parking needs, etc. Design widths of pavement on thoroughfares differ considerably in various cities, it was noted, traffic lanes varying from 10 to 13 ft., parking lanes from 6 to 10 ft. It was agreed that streets

80 ft. to 100 ft. wide or wider are too wide for safe crossing by pedestrians unless center zones are provided.

Curb and gutter details are also far from standard, particularly in outlying areas. While some cities favor flat or rolled curbs, others find that with such curbs trucks tend to get up into the grass when passing other vehicles or turning. There is also considerable difference for and against the practice of placing the sidewalk immediately adjacent to the curb. This is admittedly hazardous to pedestrians, who may be splashed on by passing vehicles; or children are in danger of being struck.

An Indianapolis spokesman noted that a 5-in. integral concrete curb cuts maintenance costs on suburban streets. At Irvington, N. J., walks have been built alongside the curbs, and street lighting and tree plantings placed on back, which is considered a good scheme.

The question of who should approve suburban plats was presented. Present city or county ordinances require that plats within a specified distance (2 to 5 miles) from the city limits be submitted for O.K. in some cases to the county and in others to the city.

Also discussed was the new and large problem of who should pay for right-of-way for urban sections of inter-city expressways. In Milwaukee one-third of this cost is being borne by the state, under a 50% fed. aid, 35% state and 15% city division of total project cost. In Minneapolis the state will assume all land costs. Texas urban expressway projects include city participation in land costs. The right-of-way problem for expressways is a major one, and delays and differences over location and land acquisition are serious factors in holding up expressway programs in some cities.

D. of P.W. —??

Just what functions ought to come under the jurisdiction of the public works department of a city, was another old controversy to receive discussion. Samuel S. Baxter of Philadelphia said that his city has gone through a cycle of thinking on the subject, as related to traffic engineering. Traffic engineers are most outspoken advocates of having traffic engineering come under the police. Philadelphia traffic engineers under police have found more freedom and responsibility, he said.

Just the reverse has taken place in Portland, Oregon, according to Commissioner Bowes of that city, who said that traffic engineering is dependent on the engineering, planning and zoning departments for much information vital to their work. Traffic engineers there cannot bring out any new development until it has passed through the other departments, after which it goes to the council with approval or disapproval.

Coming back to Philadelphia, it was noted that the traffic engineer under police jurisdiction is also given some prosecuting and control functions. Whereas sign erection was formerly an "orphan" activity, depending on the pleasure of other departments, it is now expedited by the traffic department's own electrical, sign, maintenance and painting divisions.

Fort Worth also has set up a separate traffic department, under a police trained man who is an engineer.

Several delegates agreed that in any event traffic engineering today must have a major status in the city government. Also that police departments generally are noted for not being readily cooperative with other city government bureaus.

Sewer and water departments ought to be combined into a single department, said one speaker, while others pointed out that water is more of a public utility and needs a different organization and service set-up as well as having its specialized technical problems. It was observed that a water department ought to supply the water and collect the bill, while it should be the engineering department's function to design and construct the facilities.

Details of traffic signal design came in for scrutiny. Commissioner Bowes of Portland urged that cities stick to approved standards of detail. "The more closely the cities adhere to standard designs and equipment as made by established manufacturers, the better off we'll all be," he noted, while decrying the tendency for cities to set up special specifications and designs based on individualistic ideas. Uniformity is needed to reduce the public's confusion in going from town to town. Parts and replacements are also cheaper in price since Portland threw out all special designs.

Too Many Titles

Personnel problems centered around the one of properly classifying jobs as one of the yardsticks for obtaining fair salaries and advancement for all. A Miami, Fla., spokesman said that a survey made of his city's 3,000 municipal employees revealed inconsistent pay and 530 different classifications. An effort is being made to reduce this figure to 200 and get a more uniform scale.

It was noted in discussion that uniformity, when achieved, tends to penalize professional and technical groups at the expense of the clerical; that there is the common practice of creating new titles to give a worthy employee a raise to hold him; and that police and fire departments tend to get a better break in pay and especially in pensions than other city employees, due to public sentiment.

Professional groups are especially in need of better salaries today in the over-$5,000 bracket in order to hold able men.

The traffic round table, one of the largest in attendance, first took up off-street parking. It was agreed that planning of parking facilities must not be left to private initiative, although private interests should be encouraged to provide the facilities, once need is determined. One speaker argued that merchants in a shopping district have no right to expect the public to finance parking lots for their patrons; another delegate noted that parking is after all a *public* service. Terminal facilities are but an extension of the street and highway roadbeds.

How to reserve available parking space for shopping customers was dealt with briefly. It was noted in one city that 40% of available space was being taken up all day by merchants and their employees. One scheme advocated is to get parking lot owners to not open their lots until after 9 a. m. Sanders of Louisville urged that parking lot owners be shown they can make more money by following this policy. Louisville is working on a parking ordinance and also getting cooperation of transit authorities.

Compulsory provisions for providing off-street space in connection with new homes, apartments and outlying commercial buildings, vary widely in different cities. Most cities do not require enough space per unit of theater capacity, story area, etc., it was said. Central business districts should be excluded from such ordinances, since they require a solution not necessarily dependent on new building construction.

The off-street parking problem, observed chairman Mickle, requires both an immediate expediency solution and a long range plan hinging on new buildings.

Several cities have set up parking authorities. Pittsburgh, with one of the largest programs of any city has the power to issue revenue bonds. Richmond has a state-created parking authority. Ohio has a legislative bill pending which would give a city power to buy property for parking space, and sell or lease it within two

(*Continued on page* 118)

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—for RELIABILITY . . . for ECONOMY . . . and for UNIVERSAL FORD SERVICE!

Whether you *design* and *build* engine-powered industrial equipment, *sell* it, or *use* it, here is a fact so vital that it deserves your most earnest attention:

Nearly all such machinery—whether pumps, electric generating plants, compressors, power units, saw rigs, ventilating and spraying units, or other portable equipment—by its very nature, will spend its service life on jobs where it's "on its own"—where reliability and ready maintenance service are all-important—and where the transportation of motor fuel makes gasoline economy a constant concern.

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Certainly, then, if your power requirements come within the range of 40 to 100 horsepower, you could not choose an engine which would offer you as many positive advantages as Ford.

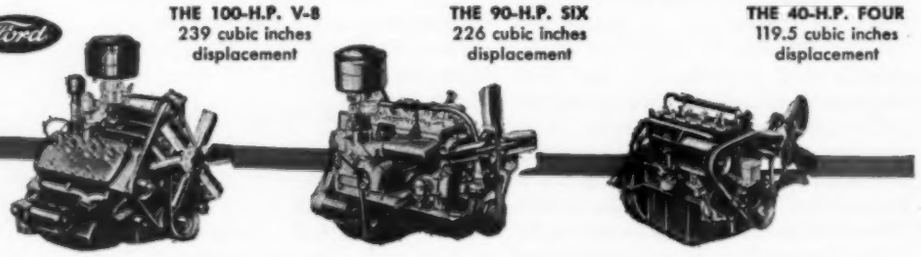
Three Ford-built engines are now available, as shown below. You can buy them singly or in quantity, through any Ford Dealer or from Ford Motor Company. For detailed specifications and dimensional data, write—

FORD MOTOR COMPANY
Industrial and Marine Engine Department
3513 SCHAEFER ROAD, DEARBORN, MICHIGAN

THE 100-H.P. V-8
239 cubic inches displacement

THE 90-H.P. SIX
226 cubic inches displacement

THE 40-H.P. FOUR
119.5 cubic inches displacement



FORD-BUILT ENGINES

FOR INDUSTRIAL AND MARINE POWER

★ Roadside mowing today is regarded as an essential, not merely for appearance but as a means of weed control demanded by farmers. It also helps maintain ditch drainage

Mow 'em Down!

. . . and keep them mowed down, is the watchword today with most highway departments. Herewith are comments on power mowing and weed control by state highway maintenance engineers

MOWING of grass and weeds along the nation's arterial roadsides is a tremendous business. And it's now a highly motorized and speeded up business, as revealed by figures from representative state highway departments. Eleven typical states for example, collectively own nearly two thousand power mowers, in addition to many tow-type or horse-drawn units. Highway departments rent many hundreds and perhaps thousands more units as needed from roadside farmers.

Eleven states selected at random report they have added 580 new power mowers in the past two years. Almost universal is the policy of eliminating hand mowing wherever possible and streamlining this job, in order to stretch maintenance funds over a more complete and thorough onslaught on weeds and a better groom ing job all around. Use of chemicals is also growing at a rapid rate.

Here is what maintenance chiefs of several states have to say on the subject:

Mississippi—35 new power mowers bought since the war; 102 in use today (F. J. Russell, Engineer of Maintenance).

Texas—400 power units in operation during 1947, of which 300 are postwar. Texas uses power for 95% of the weed and grass cutting job (G. B. Finley, Maintenance Engineer).

Pennsylvaina—From Warren K. Myers, Chief Maintenance Engineer: Mowers are started when growth reaches 6 in. and is continuous through summer. Hand mowing is undertaken just prior to July 4 and Labor Day, to take care of growth around guard fence and structures.

On main highways the entire right-of-way is kept mowed all season. On secondary highways berms are mowed during summer and growth removed within right-of-way limits during winter months.

Oregon — From E. A. Collier, Maintenance Engineer: All our shoulders and roadsides are mowed at least once a year; as often as four or five times a year; practically 100% with power machines. There are only a very few sections where we can hire teams although we still have quite a number of old pull mowers.

California 3-Way Program

California—T. H. Dennis, Maintenance Engineer: Control of weed growth along California highways is necessarily divided into three main projects, each governed by a separate policy.

(1). An over-all policy provides for general roadside weed control to maintain road width and maximum sight distance, and to generally preserve a clean roadside appearance. This work is done largely with power mowers, although in some sections of the Redwood area where vegetative growth is excessive, the state has recently tried to eliminate broad-leafed woody growths such as thimble berry, willows, alders, etc., with the use of 2,4-D spray.

Mowing is necessary on most roads to reduce grasses and summer weeds during the summer and fall. This is done with 47 power mowers, some operated double-shift. These units mow about 13,000 roadside-miles from one to six times annually. We have been able to replace some obsolete mowers this year with 26 new machines. Eleven power lawn mowers are also employed on landscaped freeway plantings.

(2). Most expensive weed control problem is that of fire hazard control

★ Minnesota tows mowers, often in tandem

along some 3800 miles of highways. In this we attempt to create a control strip adjacent to the improved shoulder in hazardous areas wherein carelessly thrown cigarettes or hot carbon from exhausts will expand themselves before igniting dry grass of the outer roadside and adjoining hay or brush lands.

This strip is made in various ways, depending upon local topographic conditions. Methods employed in their order of importance this year are: discing and/or blading; spraying with diesel oil and burning while the surrounding vegetation is still green; burning the control strip with a flame burner; chemical soil sterilization.

(3). The third weed control problem involves the abatement of noxious weeds from highway right-of way to comply with county ordinances governing these plants. This work is conducted either with highway crews or by contract.

Virginia Adding Tractors

Virginia—From H. J. Neale, Landscape Engineer: During the 1947 season the department has had 150 tractor mowers of various types, 56 motor lawn type mowers and 19 horse-drawn mowers in operation constantly. Ninety-six tractor mowers and 39 motor lawn type mowers were purchased in 1946 and 1947. This equipment is handling 9,000 miles of primary highways, now mowed regularly.

Virginia is experimenting with the use of various weed killer chemicals and it is found that they work very satisfactorily under certain conditions. The greater part of such control work has been around traffic signs and bridge heads.

Power Mower Use Growing

	Bought Since War	Total Units Owned
California	26	58
Indiana	..	150
Iowa	50	360
Kentucky	..	152
Mississippi	35	102
Missouri	84	147
New York	60	200
Oklahoma	29	115
Oregon	15	51
Pennsylvania ...	123	156
Texas	300	400
Virginia	135	206
Washington	23	...

New York—Writes V. L. Ostrander, Superintendent of Operation and Maintenance, N. Y. State D. of P. W.:

Weeds and grass on the shoulders and backslopes of our highways constitute an important and an expensive problem. Along nearly the whole state mileage grass grows vigorously, the exceptions being parts of our mountainous areas where shoulders are either rocky or loose sand. Together with grass on shoulders, weeds and brush are quite prevalent on backslopes throughout the whole mileage.

Mowing of shoulders is wholly accomplished by power mowers, owned or rented. These machines cut reachable areas of slopes, below or above the horizontal. Cutter bars on state-owned machines now are required to have a range of 90° above to 35° below horizontal. We find this wide range to be very helpful.

The higher or otherwise inaccessible slopes are now largely cut by hand scythes, an operation we are striving to minimize and possibly eliminate. Trimming around guard rails, etc., is done by our power mowers so far as is practicable but a very considerable amount of hand cutting is still necessary. Some walk-type power mowing is done here but we have not yet had a really satisfactory machine for less accessible locations.

★ Hand pusher-type power mower along an urban parkway section of a Massachusetts arterial. More and better designed units of this type are needed on our expanding mileage of expressways

Removal of Cuttings

Removal of cuttings is also a troublesome and costly feature. Limited but good use has been made of conventional short-length dump-type hay rakes. These are about 6 ft. in length to conform to shoulder width without extending into ditch or on pavement. Aside from this, gathering of cuttings has been done largely by hand.

Recently the state has had opportunity to use a vacuum pick-up machine for collecting grass, weeds and small brush and it appears possible to develop it into a useful instrument under proper circumstances.

On grass shoulders considerable advance has also occurred by mowing frequently to make raking unnecessary. This practice maintains an attractive appearance and eliminates clipping removal, but has the disadvantage of stimulating grass growth and building up shoulders above the pavement elevation. The wartime shortage of power-mowing equipment adversely affected our whole shoulder-mowing program and prevented large expansion of the frequent mowing schedule.

Roadside improvement forces are progressing with the development of grass and turf which will require less mowing, and they are also doing very well with chemical weed elimination. Recently rebuilt highways have the advantage of substantially flattened slopes, permitting nearly complete power mowing, but still by far the larger mileage is afflicted with slopes too steep for efficient cutting. Future reconstruction will, of course, progressively simplify this problem. The department now owns 200 power mowers. A substantial program of replacement and additional machines is under way now for next season's use.

Indiana, 60,000 Acres

Indiana—From Chas. T. Misner, Superintendent of Maintenance: The

state system includes 10,432 miles, representing 60,000 acres of right-of-way to maintain. We start mowing May 1 in the southern part, and by June mowing is in progress throughout the state. All rights-of-way get mowed twice a season, and main arteries as much as four or five times to the ditch line. One hundred and fifty power mowers and 50 drawn mowers run daily all season; 72 power mowers were added in 1946. Part-time rental agreements are in force with some 250 farmers. Some of Indiana's roads, especially in southern hilly areas, still require considerable hand mowing due to steep backslopes.

Iowa has practically eliminated team mowing. Probably 50 horse-drawn mowers are still on inventory for occasional use. The commission has 360 power mowers, 50 being new; 40 or 50 additional units needed. Mowing was delayed a month this year by flood conditions. Iowa's goal is to have all weeds cut on the right-of-way by mid-July, but "we have never reached our goal, and missed it this year by six weeks," according to M. H. Root, maintenance engineer.

End Hand Mowing

Missouri—The goal is to completely eliminate hand mowing, according to R. M. Whittier, Engineer of Maintenance. This will probably be impossible for a number of years due to the steepness of the slopes and to general roughness of right-of-way. Power mowing, however, is highly desirable from both an economical and appearance standpoint, he adds, continuing:

"Within a few years the power mower fleet will probably increase to 250 power mowers (now 3 or 4). We pull one or two pull mowers behind each power mower when the condition of the right-of-way will permit.

"Missouri's present policy provides for two complete mowings a year, the first before May 30, the second completed around September 1. The general policy is to keep the right-of-way as neat in appearance as possible, and to mow the weeds sufficiently often and at the proper time to prevent most weeds going to seed. We mow shoulders, inslopes and downslopes often enough each year to keep them in a neat condition, which, of course, requires three or four mowings or more depending on rainfall."

Minnesota Practice

Minnesota—Reports C. L. Motl, Maintenance Engineer: It has been the expressed wish of the commissioner of highways to keep the 11,000 miles of trunk highway roadsides in a reasonably neat and presentable condition. Minnesota is spending about $700,000 annually for this maintenance. All work is done with power machines except inaccessible areas. The department uses 542 mowing machines of various types, of which 277 are converted agricultural mowers (as illustrated).

★ Oklahoma: One of 115 state-owned power mowers, 29 of which were new this year. During 1947 the state also employed 85 rented tractor mowers and several team-drawn 2-up machines, according to R. B. Winfrey, maintenance engineer

The agricultural mowers are usually drawn behind trucks, two or more at a time. As many as four mowers are drawn behind one truck where highway rights-of-way are sufficiently wide and obstacle free.

Minnesota also utilizes 177 one-man power mowers or sickles, self-propelled but guided by a man walking behind. All other machines are power mowers with operator's seat. In this group of mowers, we are gradually turning towards agricultural type tractors equipped with mowing attachments. In addition, a large number of power mowers and horse-drawn mowers are employed on an hourly basis.

Construction plans in Minnesota now embody a roadside treatment, including the seeding of suitable grasses, so that roadsides can be easily mowed by machines; and in farming areas, the mowing of large areas is performed by the adjoining land owner without cost if the grass can be utilized for hay.

In recent years the state has gone into the use of chemicals for weed killing and finds these to be very effective. As time goes by, the department will undoubtedly use increasing quantities of chemicals to kill weeds in inaccessible places, to kill noxious weeds that are agriculturally objectionable, and to control and eradicate some types of brush-growth in timber-land areas. The chemical is applied over small areas with hand-operated spray pumps and over larger areas with power-operated spraying equipment attached to small-sized road oil distributors or bituminous power-operated maintenance units—in other words, we utilize the spraying requirements. In order to be able to reach areas some distance from the road, hose of sufficient length is provided.

Kentucky—W. J. Crouse, Director of Equipment: The number of power mowers (now 174) will be augmented as rapidly as they can be procured and men trained to use them. Brush, bushes, weeds, overhanging limbs and all other obstructions must be cleared away between July 1 and August 20. The efficiency of the mechanical mowers is saving the state road fund many dollars formerly used in the employment of extra help for that period alone.

●

The Maine Turnpike Authority is considering a 25-cent boost, to 75 cents, in tolls for passenger cars on the new 45-mile long Kittery-Portland highway. Whatever the charge decided upon, it will have to finance a permanent staff of 60 workers and liquidate $20 million in bonds.

Counties, Too, Are Motorizing Mowing

"We are using 8 power mowers at present," reports Ray Traver, County Superintendent of Highways Onondaga County, N. Y., "and believe it will be necessary to add four more for next year's work. This county also is employing chemicals on an experimental basis."

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Figuring Aggregate Costs

The Arkansas State Highway Commission estimates mineral aggregate or surfacing projects, as well as other types of road work, by actually figuring each job

By A. B. Johnson

Office Engineer, Arkansas State Highway Commission, Little Rock

THE Arkansas state highway staff has followed the policy of estimating each project largely from actual cost data. While a weighted average based on recent control prices is employed for minor items [See Roads and Streets, May '47] the major items are figured from actual material quotations and freight rates, etc., and equipment costs computed from a table of monthly rental rates adjusted to current conditions.

Our method differs from that of many contractors in that rather than figure the whole job, we seek a fair unit price for each item or quantity. Unit prices are the best indices for keeping a running tab on cost trends, and for helping to determine when a given project is badly out of line and where and why.

An Actual Case

Standard form sheets are employed for estimating the various types of projects. In the case of a mineral aggregate or surfacing contract, for example, there are five sheets, which we fill out with the help of a pencil work sheet of data kept on the office deck. Let us take an actual project and follow the estimating procedure. The five sheets, filled out with figures used on an unidentified recent project, are reproduced herewith.

Fig. 1 begins with space for listing the type of material wanted and the quantity. Then come alternate space for either commercial or contractor-produced material. If commercial, it is easy to ascertain and enter the per-ton cost and the freight, after which the unit cost f.o.b. a siding at the project is figured by adding 50% to convert from tons to cubic yards and to allow for wastage.

If the source is local, the form notes whether the site must be cleared and grubbed, whether there is enough yardage in the pit for the job, depth of stripping, and kind of material to be found in the pit. Much of this intelligence is often readily available right in the office, from a state-wide survey of non-commercial road aggregate sources.

Going on, we note need for crushing and screening, and for blending, wasting fines, and addition of binder. Also royalty to be paid and nature of haul road to be built, if any. All this seems quite elementary, but the point is that we don't take any of the cost elements for granted but figure all the way through.

Turning to Sheet 2, we then translate the general conditions of Sheet 1 into an estimate of the time required to produce and deliver the material. In this instance the yardage was small and only 0.8 month's crushing plant operation was considered necessary (See Sheet 5, item 7). A motor patrol would be needed for 30 days to handle the work on the road, assuming ten days' extra time before and after mixing and spreading and shooting; 30 days plus 10 equals 1.6 months. Roller time is similarly entered as 1.2 months. A separate part of the form is devoted to open-graded material, which in general re-

ANALYSIS OF COST
OF MINERAL AGGREGATE

Job 10298 Made By JTP

FA Project S-179(3) Date 3-10-47

Quantity:
Material - Class 25 Cubic Yards 11940 (1)

Source and Kind:

Commercial

Location of Source _____

Cost per ton at Source + 2% State Tax = $ _____

Freight per ton to Job Siding + 3% Federal Tax = _____

Total Cost per ton on Siding at _____ = _____

Times 1.5 = Cost per C. Yd. or $ _____ (2)

Additional Binder Required _____

Local Source

Name of Pit or Quarry Newsom Pit Location _____

Clearing and Grubbing Required Yes

Approximate Quantity Available Sufficient for Job

Stripping in Feet Depth Av 2' Silty Clay

Kind of Material Available in Pit Clay Gravel

Per Cent Oversize 23% Requires Screening _____

Crushing and Screening Yes

Blending required for Gradation Control _____

Requires Wasting Fines No

Requires Additional Binder Yes

Royalty per Cubic Yard $ 0.05 (3)

Does a haul road have to be constructed No; if so
Approximate Cost $_____ (Add to Moving In and Out Cost)

Dead Haul to Project _____ Miles.

★ Sheet 1

Time Required in Months for Equipment and Personnel:

For - Shovel or Crane
Trucks
Hauling Units
Screening Plant
Screening and Crushing Plant (Use 0.8 Month - See Item No. 7)

Dense Graded:

Motor Patrols will be required a minimum of three days before the shooting and mixing starts and will be required for seven days after to complete the mixing and spreading. Based on 10,000 gallons of liquid or emulsified asphalt shot and mixed per day, the shooting and mixing will require 30 days. Then the Motor patrols will be required

$$\frac{3 + 7 + 30}{26} \text{ or } 1.6 \text{ months (Use } 1.6 \text{ Mo.)}$$

Common labor and Foreman will be needed for the same length of time as for the Motor patrols.

Rollers will be needed starting seven days after starting the shooting and mixing operations and for eight days after it is completed to do the compacting of the surface course or a total of

$$\frac{30 - 7 + 8}{26} \text{ or } 1.2 \text{ months.}$$

Open Graded:

Motor Patrols will be needed a minimum of one day before shooting and mixing starts and will be required for one day after to complete mixing and spreading. Based on 10,000 gallons of liquid or emulsified asphalt shot and mixed per day, the shooting and mixing will require _____ days. Then the Motor Patrols will be required

$$\frac{\quad + 2}{26} \text{ or } \_\_\_\_ \text{ months (Use } \_\_\_\_ \text{ Mo.)}$$

Common labor and Foreman will be needed for the same length of time as for the Motor Patrols.

Rollers will be needed starting the day that shooting and mixing starts and for one day after it is completed to compact the surface course or a total of

$$\frac{\quad}{26} + 1 \text{ or } \_\_\_\_ \text{ months.}$$

Rental on the rollers is added for 1/4 month as half the cost of holding the roller idle on the project awaiting the Sealing Operations.

Equipment Rental, Repairs, Operation, Labor, Fuel, Lubricants per Month:

(Total cost figure includes all operators and crews needed except common laborers)

No. Required	Item		Amount	Time Req'd in months
	2 1/2 C Y Shovel or Crane	(Oper. and Oiler) $ 3705	$	
1	1 1/4 C Y Shovel or Crane	(" " ") 2096	1677	0.8
	1/2 C Y Shovel or Crane	(" " ") 1307		
10	4 C Y Dump Trucks	(Driver Incl.) 907	7256	0.8
	10 C Y Hauling Units	(" ") 1754		
1	80 HP Tractor & Bulldozer	(Operator Incl.) 1418	1134	0.8
1	80 HP Tractor & 10 CY Scraper	(" ") 1618	1294	0.8
	1000 Gal. Tank Truck	(Driver ") 516		
	Pneumatic Roller	(No Operator) 132		
	Heavy Road Disc	(" ") 30		
	Farm Tractor	(Oper. Incl.) 492		
	2" Centrifugal Pump & Motor	(No tender needed) 71		
	Screening Plant (50 to 100 CY/Da (All crew except common labor included)	1103		
1	Crushing and Screening Plant (Heavy Duty Dbl. Crusher (All crew except common labor incl.)	2672	2138	0.8
2	Tandem Motor Patrol	(Oper. Incl.) 1096	3507	1.6
	Pick-up Service Truck	(Foreman) 256		
	2-ton Flat Bed Truck	(Driver Included) 504		
2	10-ton Roller (Tandem or 3-Wheel)	(Oper. Incl) 876	2102	1.2
	Heavy Duty Rooter	(No Operator) 177		
	•315 cf. Compressor and Wagon Drill	(Crew and Compressor included) 5772		
	•160 cf. Compressor and 2 Jack Hammers	(Hammer men and Compressor included) 2648		
	24" x 36" Primary Crusher and 120 HP Motor	1350		
1	Foreman	455	728	1.6
1	Mechanic	380	608	1.6
	Powderman	379		
15	Laborers	182	4368	1.6
	2 CYM Bit. Traveling Mixer	(2 Oper. & Oiler) 3194		
	Bituminous Spreading and Finishing Machine	(Operators Included) 1704		
2	Rental on Roller for 1/4 month at $62.50 each		125	

Total - - - - - - - $ 24937(4)

• Includes Steel, Bits, Dynamite and Exploders.

★ Sheet 2

quires fewer days of grader on hand, and also a different situation on rolling than for dense-graded. The form is based on an average daily production of 10,000 gal. of asphalt, which is the average for three jobs each of seven major contractors operating in the state.

Sheet 3 gets into actual monthly operating cost. It takes equipment costs into consideration; usually it is found that equipment expense is the big question along with labor. The monthly rental rates shown represent recent OPA rental rate in each instance, plus the Associated General Contractors' estimate for monthly operating cost including fuel and lubricants, plus wages of the operator or any other labor directly connected with the machine.

As shown here, the equipment for this job was believed likely to include a 1¼-yd. shovel, ten 4-yd. dump trucks, two heavy tractors with dozer and scraper, a crushing and screening plant, two graders, two rollers, a foreman and mechanic in addition to operators (figured in), 15 laborers, and rental on a stand-by roller. Based on working time figured in Sheet 2, the total job cost of equipment, labor, and operating comes to $24,937.

A revision of this form, issued in July, 1947, replaces the $2672 item for the crushing and screening plant, with a figure of $5730. Also we've added space for listing a stand-by crushing and screening plant at $1872 when the project involves bituminous surfacing. Other revisions are likely to be made from time to time to keep this sheet reasonably in line with prevailing costs, the current trend of equipment purchase prices being upward.

How Many Trucks?

Now to Sheet 4, on which is entered the estimated equipment capacity per day, 600 c.y. being assumed for the crushing plant in this instance. Haul road conditions are noted since they affect truck haul. Truck capacity in yards per day is figured by dividing 600 minutes (10-hr. day) by a formula which allows for round-trip time, 5 minutes lost in loading, road speed, and distance of haul. Ten trucks are shown to be needed.

Sheet 5 sums up costs of materials, equipment and operation, and moving in and out, plus bond, insurance and overhead, resulting in a unit cost per cubic yard in place of $2.74. The move-in and move-out cost for materials production is often lower these

★ Sheet 3 (since revised)

Equipment Capacity per Day: (Average Capacity for Duration of Operation)

(Fill in only the appropriate space which limits or controls production)

Cubic Yards per Day Capacity of Shovel _____(5)
(500 to 1000 x CY Size of Dipper)

Cubic Yards per Day Capacity of Screening Plant _____(5)
(500 to 1000)

Cubic Yards per day Capacity of Crushing and Screening Plant
600 (5)
(500 to 1000)

Capacity of Railroad Siding = ___Cars of C.Yds per Day _____(5)

Capacity of Local Source Supplying Job in C.Yds. per Day_____(5)

Haul Road: Heavy Grades _____Rolling ___✓___ Level _____

Adequate for passing at driving speed Yes

Surface: Rough _____ Fair ___✓___ Smooth _____

Firm ___✓___ Medium _____ Soft _____

Capacity of Truck or Hauling Unit in C. Yds per Day

$\frac{600}{(\frac{120 \times \text{Av. Haul}}{\text{Av. Road Speed}} + 5)}$ x Bed Capacity = 82 C. Yds/Day/Unit

Where: Average Job Haul in Miles = 6

Average Road Speed in mph = 30

(4 C.Y. Dump Trucks - 20 to 35 mph)
(10 C. Y. Hauling Units - 8 to 20 mph)

Bed Capacity in Cubic Yards = _____

Number of trucks or hauling units required:

(5) $\frac{600}{82}$ = 7.3 Use 8 units + 2

(6) 82 Units for plant haul =
10 Average number of Units required.

Time in Months Required:

(1) 11,940 = $ .72 Use 0.8 Months (7)
26 x (5) 15600

Cost of Materials for Mineral Aggregate

(1) 11940 x (2) or (3) .05 = $ 597 (8)

Total Estimated Cost of Mineral Aggregate

Equipment, Operation, Fuel, Etc. (4) x (7)	$ 24937
Cost of Materials (8)	597
Cost of Moving in and out (estimated Distance 140 Miles)	1500
Plus 10% for Bond, Insurance and Overhead (Use 12% to 15% if explosives are needed and depending upon the property and personal risk involved)	2703
Total Cost of Operation	$ 29737 (9)

Estimated Unit Price per Cubic Yard:

(9) 29737 + 10 % Profit and Contingencies =

(1) 11940

2.739 per Cubic Yard

Use 2.74

★ Sheet 4

★ Sheet 5

days than formerly, due to the ready mobility of modern plant equipment, which can be quickly demounted and towed over the road in sections each on their own rubber tires. Some plants are entirely self contained and complete on one rubber tired chassis.

A procedure similar to the above is also employed in estimating grading, base course, and emulsified or liquid asphalt surfacing.

●

New Data Revealed on Night as Fatality-Breeder

Darkness still holds priority in causing fatal accidents, according to new evidence revealed in a recent study compiled by traffic safety authorities. In an analysis of 261,304 accidents reported by 14 states, figures show that 44.6% occurred in darkness. Of the 8,389 fatal accidents, 4,880 or 59.9% occurred in darkness. The number of fatal accidents in darkness was 40% greater than in daylight. As an average, 1 accident in every 22 was fatal in darkness, compared with 1 in 37 in daylight. The dark-hour fatality rate is much higher in urban than in rural communities. For copy of the report, which gives detailed comparisons, percentages and ratios, write for item M-10472.

Acme Photo

★ Before installment of incandescent system, Schenectady, N. Y.—Schenectady's Erie Blvd., once a canal where boats were drawn by mules, but now a busy 15,000-car-per-day thoroughfare, looked like this under its old arc lighting system. Although the arc lighting was adequate in its day, modern traffic declared the arc lights ready for retirement. A new incandescent lighting system made its debut May 15th, giving motorists a brighter outlook

Acme Photo

★ Incandescent lighting system, which made its debut May 15, brightly illuminates Erie Boulevard in Schenectady, making it one of the eight most brightly lighted streets in the U. S. The lighting system replaced outmoded arc lighting on the street, transforming the once-dim thoroughfare into a "super white way." The new system gives the street ten times more brilliance in the center lane and four-and-one-half times greater brilliance over all

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The General LCM

FOR

Logging

Construction

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New Angle Pulling Power

More Rubber • Greater Traction

Squeegee Power Cleats • Ejection Action

Snag-Resistant Tread and Sidewall

Heavy Shock-Absorber Plies

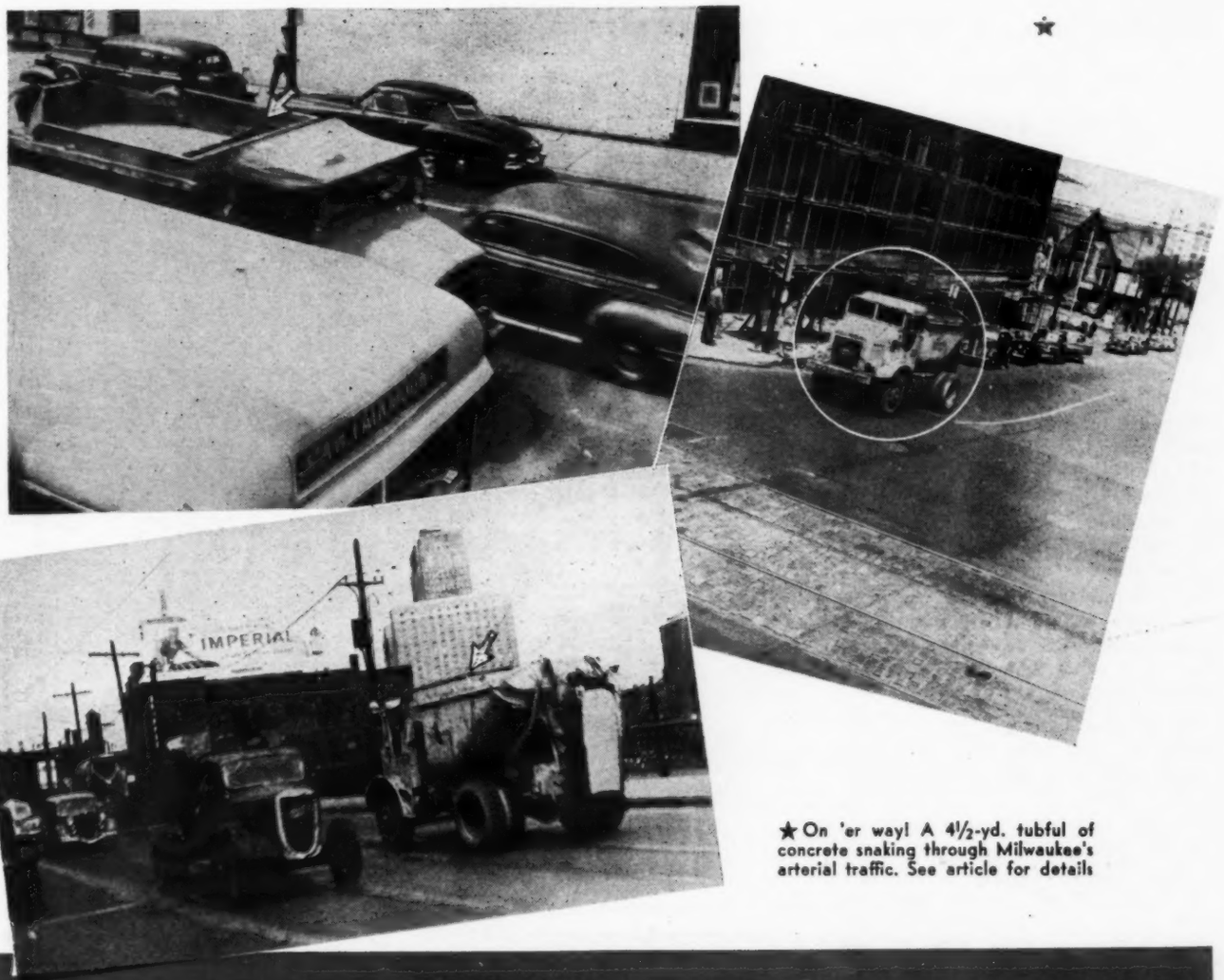
Buttressed Highway Rib • Reinforced, Extra Heavy Beads

Natural Rubber Impact Cushion

Deeper, Cool-Running Shoulders

The GENERAL L.C.M.

THE GENERAL TIRE & RUBBER CO. - AKRON, OHIO



★ On 'er way! A 4½-yd. tubful of concrete snaking through Milwaukee's arterial traffic. See article for details

½-Hour Concrete Haul

WITHOUT AGITATION

Dump trucks prove effective and economical on 10-mile round trip through downtown traffic

PAVING of eight blocks of 8th Street in Milwaukee this past summer afforded an interesting demonstration of the possibilities of concrete delivery in non-agitating truck bodies.

The contractor on this municipal paving project was Badger Construction Co., of Milwaukee. The job involved about a mile of concrete pavement base 8 in. thick and 40 ft. wide, or approximately 5,500 cu. yd. of concrete. On projects of this nature heretofore the contractor has often employed ready-mixed concrete, delivered in truck mixers or trucks with agitator bodies. Prior to the beginning of the 8th Street work a local ready-mix supplier had purchased a fleet of trucks equipped with 4-yd. dump bodies (Maxon Dumpcrete) designed especially for concrete delivery. Nine such trucks were employed. The supplier was The Kolinski Concrete Company, located some 5 miles from the center of the job, which company by the way was one of the pioneers in supplying air entraining concrete in the Milwaukee area. It is noteworthy that Kolinski doesn't feel that agitation is necessary with air entrained concrete, and that he delivers central mix concrete in agitators as well as Dumpcretes, but the agitators do not revolve in transit.

Trucks averaged 63 minutes round trip to the 8th Street job including all delays. Delivery was via busy arterial streets fringing the central business district and involving numerous stop lights and 3 lift bridges but only minor grades. Shortest time was 22 minutes one way, and 45 minutes round trip. The daily yardage of the nine 4-yd. trucks hauling 4½ yd. geared to finishing work and slowed

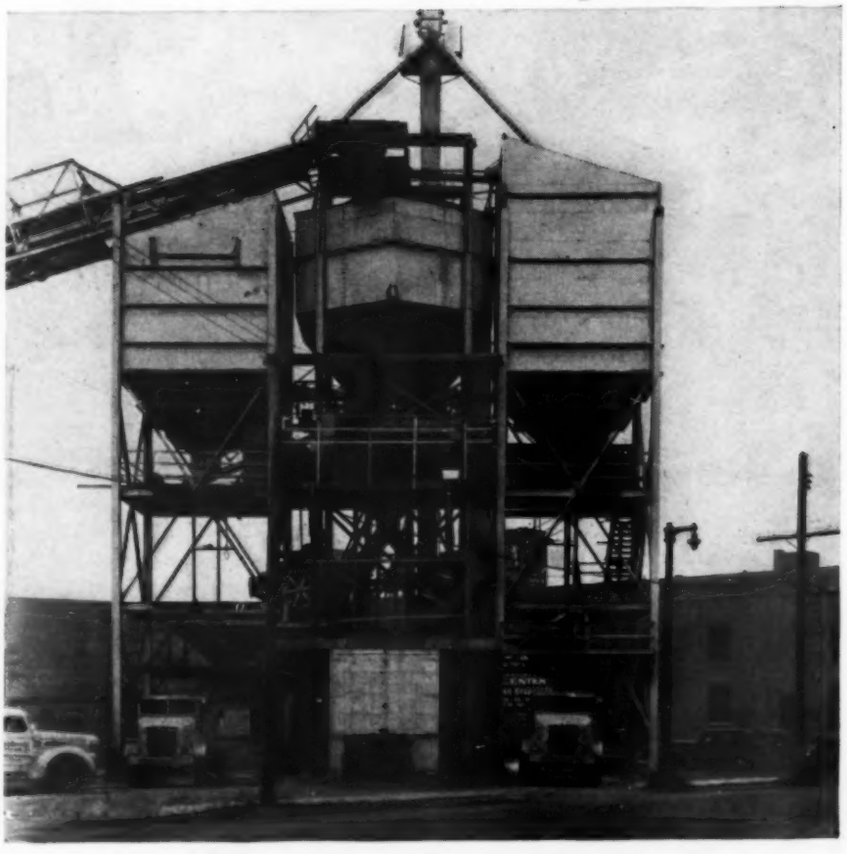
at times by other job delays, was logged as follows over an 11-day period:

July	21	127 c.y.
	22	194.5
	23	285
	24	275
	25	90
	28	180
	29	243
	30	237.5
	31	274.5
Aug.	1	298
Aug.	4	256.5

One of the most interesting features of this work and subsequent jobs was the attitude of the workmen. At first they were bitterly opposed to the concrete being delivered with low slump and would sometimes purposely delay operations. Toward the end of the project, however, these same workmen discovered they could place air entrained concrete of 3 in. slump just as fast as they could the sloppy mix which was unsatisfactory to the city. The maneuverability of the short wheel-base trucks, together with the high speed of discharge, resulted in less work with the moderate slump concrete than with the wet.

It was also found out that no segregation problem existed under this delivery of 5 miles, the re-mixing effect of the baffles and gates as the concrete was dumped aiding in maintaining uniformity. The loss of slump from the plant to the job, even in very warm weather, did not average more than ½ in. It is of record that the temperatures between July 21 and August 4 were generally in the 90's.

The designed concrete mix consisted of 1057 lb. Duraplastic air entraining portland cement, 2892 lb. sand, 4612 lb. of two combined sizes of gravel, and 52.9 to 57.4 gal. water. The 2¼-yd. batches were mixed for 1½ min. in a 3-yd. tilting mixer, there being two batches to a load. It was noted that if the first of the two batches was slightly wet, the water content could be corrected by the second.



★ At Kolinski's plant—loading two 2¼-yd. batches into a Maxon Dumpcrete

The concrete was placed half width at a time, using a chute as pictured, finishing accomplished by means of a hand-drawn screed on which was mounted an electric vibrator.

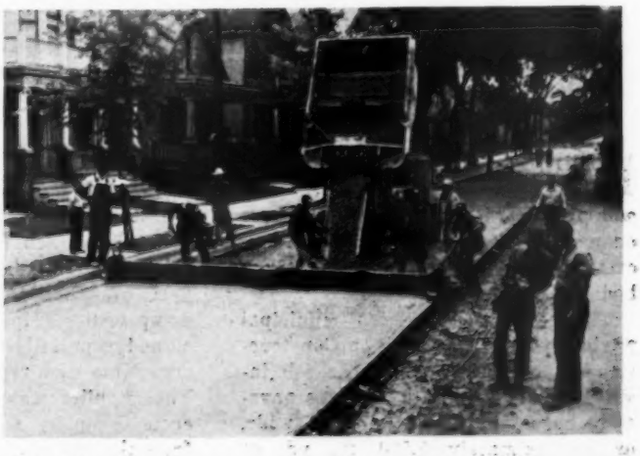
New ASTM "Specs" on Non-Agitating Haul for Ready-Mix

The American Society for Testing Materials has withdrawn the present Specification for Ready Mixed Concrete (ASTM Designation: C94-44) and adopted a new specification (ASTM Designation: C94-47T). While printed copies of the new specification are not generally available, it was included as an Appendix to the Report of Committee C-9 distributed as a preprint before the annual convention of the ASTM in June.

Changes in the new specification over the old, as announced by the National Ready Mixed Concrete Assn., are as follows:

(1) Provisions for the use of non-

★ How concrete was dumped and chuted, via re-mixing baffles embodied in tailgate to insure uniformity in the mix. The driver doesn't leave his seat



★ A light vibratory screed made simple work of spreading and finishing, hand spreading being largely eliminated by careful chuting. Note man at right lifting screed across manhole

agitating equipment. Section 10 of the new specification which provides for the use of this type of equipment for normal and air-entraining concrete reads as follows:

"Use of Non-Agitating Equipment

10. Central-mixed concrete may be transported in non-agitating equipment only when provision for such method of transportation is made in the contract (Note). When the use of non-agitating equipment is so permitted, the following limitations shall apply:

(a) Bodies of non-agitating equipment shall be smooth, watertight, metal containers equipped with gates that will permit of control of the discharge of the concrete. Watertight covers shall be provided for protection against the weather when required.

(b) The concrete shall be delivered to the site of the work in a thoroughly mixed and uniform mass and discharged with a satisfactory degree of uniformity as prescribed in Paragraph (c). Discharge shall be completed within 45 min. after the introduction of the mixing water to the cement and aggregates.

(c) Slump tests of individual samples taken at approximately the one-quarter and the three-quarter points of the load during discharge shall not differ by more than 2 in.

NOTE: The use of non-agitating equipment for the transportation of concrete may result in segregation and difficulty in discharge. Well proportioned plastic mixtures, short hauls, and smooth roads are favorable for the use of such transportation equipment."

(2) Recognition is given to the increasing use of air-entraining cements and air-entraining admixtures by the industry. Provision is made for the purchaser to make tests of the air content of concrete when an air-entraining cement or air-entraining admixture is used. The specifications recommend that the air content be maintained within the limits of 3 to 6%. Furthermore, it is stipulated that provision be made to control the admixture used within 3% of the quantity required whether the admixture is dispensed on a volumetric or a weight basis.

(3) Additional equipment requirements. Stationary mixers are required to "be equipped with an acceptable timing device that will not permit batch to be discharged until the specified mixing time has elapsed." Truck mixers are required to "be equipped with means by which the number of revolutions of the drum or blade may be readily verified."

(4) Miscellaneous changes. Other revisions, not merely editorial in nature, provide for the elimination of the design of concrete mixtures on a flexural strength basis when the purchaser requires the manufacturer to assume responsibility for the design of the mixture. Also, no reference is included in the specification to standard methods of testing for cement content of hardened concrete or for securing, preparing and testing cores from hardened concrete. An addition to the new specification over that of the old is the inclusion of a table giving suggested water-cement ratios for various structures and conditions of exposure. This supplements the present table which gives the suggested compressive strength of concrete for various conditions of exposure.

●

(*Continued from page* 69)

Taking Soil Samples by Soil Tube Method

samples for shipment to the laboratory.

This 1-in. sampler, like the larger sampler, is constructed so that the driving rod and plug closes the cutting point until the depth is reached where samples are desired. By turning the inside extension rods in a right hand direction the plug can be released, raised and held in place by engaging the threads in the nut section. The sampler is next driven 2 or 3 ft. to obtain a sample and then the outside extension tubes are turned in the hole in a right hand direction to shear off the soil core at the bottom of the sampler. After this operation, the inside rods are turned again in a right hand direction to further retract the plug and form a seal against suction between the plug and nut section. After the sampler is removed from the ground, the extensions, cutting point, nut section and plug assembly are disconnected. The sample retainers are then removed from the sampler tube, after which the soil cores are cut with a piano wire coping saw before being capped and sealed for testing purposes.

Routine subgrade surveys are also made with this sampler. Fig. 5 shows the sampler, extension tubes and other tools normally used for sampling to a depth of 8 ft. With this equipment it is usually possible for two men to make 75 to 100 borings in one day. The classification and uniformity of the ground is determined from the driving record and a visual examination of the cores. After the materials have been identified and a soil profile prepared, large diameter auger borings are made to obtain adequate samples for testing to determine the relative compaction of the ground and the suitability of the materials for use in subgrade and embankments.

Fig. 6 shows the boring record report form used by the California division of highways together with typical field data for a power boring.

●

Technical Books for Finland

Finland has an excellent and keenly scientific minded technical institute, Teknillinen Korkeakonlu. During the war its library was bombed and totally destroyed. In the remarkable efforts for recovery that the Finns are making, the lack of technical library facilities is a serious handicap. Consequently the Institute would welcome gifts of scientific and technical books and periodicals from America to take the place of those destroyed.

Any such gifts should be marked for the Institute of Technology, Helsinki, and sent to the Legation of Finland, 2144 Wyoming Ave., N. E., Washington, D. C. Dr. K. T. Jutila, the Finnish Minister, will arrange for their being shipped to Finland.

●

Truck Freight Volume at New High—The truck tonnage index compiled by the American Trucking Associations, Inc., stands at 198 for the first eight months of 1947, compared to 182 for the same period last year. The index counts the years 1938 through 1940 as a normal 100.

Mail Inserted Card or Inquiry Blank (page 130) for Equipment Data

Again this issue of Roads and Streets carries descriptions of many new labor-saving efficiency devices and latest material developments. See our New Equipment and Materials Section beginning on page 108, for which a numbered reply card has been inserted to help you request data on items that interest you. Also on page 130 is an inquiry blank and advertisers' index which will help you get data on equipment and materials you need.

GALION TANDEM *With* SPUR GEAR DRIVE

This high-quality double-reduction final drive construction is more costly--but well worth it, because all gears are machine-cut alloy steel-accurate and durable. All gears are protected from dirt and grit.

Three sizes--with a variable weight range from 5 to 14 tons.

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Unique Signal System

for Houston's 4-Street Expressway Grid

Automatic synchronized system, one of the largest ever designed as a single operating unit

By W. J. Van London

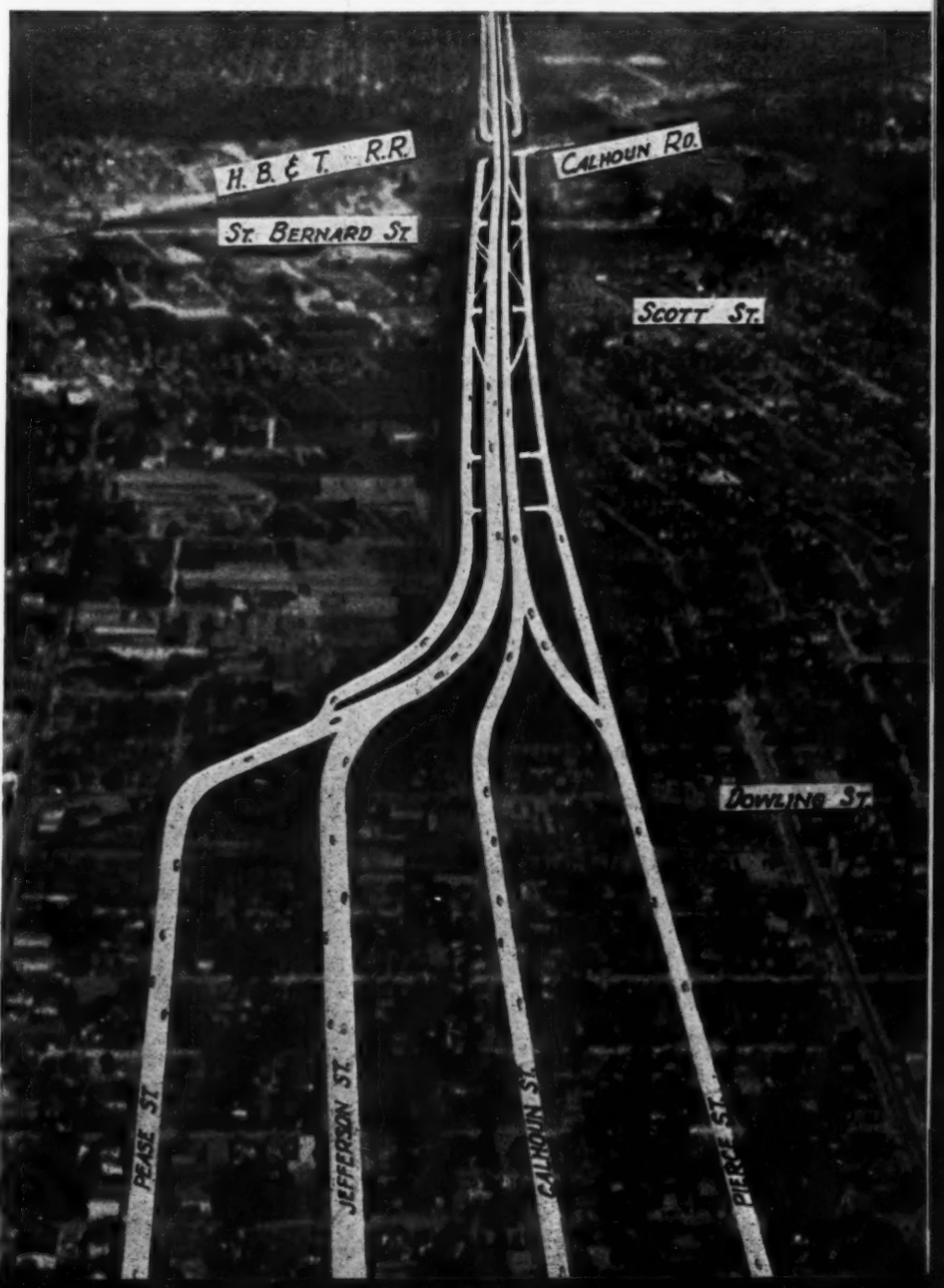
Engineer-Manager
Houston Urban Expressways
Texas Highway Department

THE Texas highway department, Public Roads Administration and the city are developing an urban expressway on the route of U. S. Highway 75 through Houston from the north to the southeast. The route passes some 5 to 8 blocks to the west and south of the central business section. There are only 4 streets leading to the west from the business area. These will be overpassed and suitable traffic interchanges provided. To the south 19 streets cross the expressway route in a distance of 1½ miles. About 75% of the traffic enters and leaves the expressway route on these streets and about 25% is traffic passing from one side of the business area to the other. Less than 6% of the total is thru highway-to-highway traffic. Following are the estimated daily traffic loads in 1957: North-south streets crossing expressway route 150,000 to 200,000; expressways, both north and southeast, 60,000 to 70,000; through expressway traffic 25,000 to 35,000. Thus, of 120,000 to 140,000 expressway vehicles approximately 100,000 will move to and from the north-south streets.

Unique Solution

A freeway type traffic facility across these 19 streets, about 1½ miles long, which would have to be elevated, costing in excess of $10,000,000, was not considered practicable at this time. Therefore, a 4-street system with provisions for connecting to an elevated structure in the future was developed. The accompanying aerial views show the transitions from the 4-street system to the north and southeast expressways and the possible future elevated freeway. The four streets will have a minimum width of 54 ft. providing two 8-ft. lanes for parking and three 12-ft. lanes for moving traffic in one direction only. Thus, 6 lanes are provided on the south side for eastbound traffic and 6 lanes on the north for westbound traffic.

The traffic on the 4-street system and on all cross streets will be controlled and directed by a double vision, automatic, synchronized interconnected signal system. The signals will be vertically post-mounted so as to be visible from all approaches on the far right and near left of the driver, and will be adjustable type with four sectional units, the bottom unit being a directional arrow. All faces will be equipped with a hooded base light for illuminating an 18" x



★ Aerial view of south transition from 4-street-system to a typical limited-access, separated suburban expressway

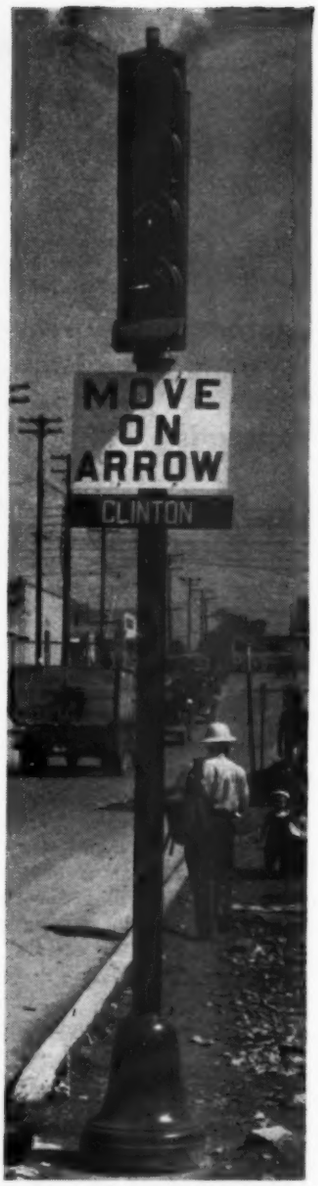
★ As with the expressways planned for other American cities, those for Houston will skirt the central business district. Transition to 4-way seen at right. Importance of the most systematic possible control of left and right turns to get to and from downtown, is well depicted here

24" informational sign, such as, MOVE ON ARROW, a 5" x 25" street name plate and where necessary a highway route marker. The accompanying picture is a typical installation.

Three dial secondary controllers will be used to provide automatically for adjustment of time cycles for variations in volume and direction of traffic and to permit or prohibit left turning, as required to facilitate traffic movement. These controllers will also be equipped with 15-time cycle gears, 5 for each dial, which will permit selected time cycles of 40, 50, 60, 70, and 80 seconds and will have flashing red and amber signals in either direction during low traffic density periods. A master controller for the system will not only keep all the secondary controllers in synchronism, but will automatically change all controllers from Dial I to Dial II or Dial III as required to provide for the peak traffic periods. The master will also control the off duty flashing period, and the base light circuit. This will be accomplished by the use of four synchronous time switches providing 3 *on* and 3 *off* operations.

The signal system is so designed that, if properly operated, it will result in the minimum of vehicle stops and will direct and control the movement of large volumes of traffic as rapidly and freely as practicable, commensurate with safety.

★ One of the interchanges in suburban area



★ Sign heads will look something like this

Our Public Relations Job:

Present the FACTS

These notes are a continuation of a staff report of the American Association of State Highway Officials' recent annual convention. See Oct. '47 R. and S.

A. EXPLAINING "what you gets" for "what you pays" is an age-old sales principal. It applies equally to the selling of multi-million-dollar public highway programs.

B. The art of explaining and interpreting complex highway needs to the public is still in its infancy. Many highway departments still bat virtually zero in this activity. Others confine their efforts to perfunctory "releases" of letting on detour news to newspapers and make no real, systematic contribution to the enlightenment and education of the man at the wheel—the guy who pays.

C. But highway departments now find themselves in the position of having to go into the public information business on a scientific basis. More, better and clearer factual data must be made available to legislative bodies in order that they can better determine highway needs on a sound engineering basis—rather than by the obsolete yardstick of political expediency, which may mean not building at all.

Thus quickly summed up are the A-B-C's of our tremendous public relations job, as highlighted during a panel discussion at the recent AASHO convention in New York.

Under Spencer Miller, Jr., of New Jersey, as panel chairman, prepared talks were given by H. S. Fairbank, deputy commissioner, Public Roads Administration; G. Donald Kennedy, vice-president, Automotive Safety Foundation; Charles H. Purcell, director of public works of California; Kenneth Perry, a public relations expert with the firm of Johnson & Johnson; Norman Shidle, an automotive industry authority; and J. Stephen Watkins, highway commissioner, Kentucky.

In opening the meeting, chairman Miller noted that in a sense we have all slept Rip Van Winkle style through a social, economic and transportation revolution. We are now waking up as a nation to the real importance of highway transportation, and must learn to guide the forces at work.

We're Selling—What?

Representing the business world and the thinking habits of businessmen, Mr. Perry threw out the question "What are We Selling?" He observed that the business community is better advanced in education on many public matters than leaders in some state capitals think. We do not have to sell communities on the need for better highway standards; the inadequacies of transportation have "pre-sold" businessmen. The task is to get down to cases with the public on "what, where, why and how." The "what" is what the public wants and needs. The "how" means how paid for as well as how designed and built. The first element then is to find out by modern techniques what the public wants, then determine how to satisfy that want and tell the people your proposed solution. Business wants to pay for highway facilities only once, not several times. Self liquidating projects, paid for without bonds and prolonged bureaucratic control, appeal most, said this speaker.

Norman Shidle, who is also chairman of the Automotive Safety Foundation's public relations committee, also dwelt on the cost question. He said that while the public is well sold today on the need for highway improvements, it wants to know more about the way tax funds are being spent. It wants to be assured of efficient administration, and to understand some of the facts. Pictures and 100-word explanations are the answer.

Panel discussion at recent AASHO meeting reveals a new conception of the highway department's public relations task. Taxpayers and legislatures must be informed through new techniques which reduce complex highway needs and benefits to simple words and pictures

Negatively the people are aware of congestion, created by present traffic surpassing the pre-war peak. A further 50% increase in traffic volume by 1967 is indicated, and the suffering public is receptive to an understandable program that will solve congestion if it thinks the improvements can be financed.

Mr. Fairbank contributed the thought that public relations is a reciprocal or two-way thing—not just "telling the world" but bringing about an understanding between two parties (engineer and taxpayer). The task is to place the highway department and its work in the right light, not simply as a builder of roads or spender of funds but as a builder of transportation.

California's Experience

Mr. Purcell described California's recent problem, which was to get more revenues to meet the needs of a big population. Planning surveys were an important basis for presenting facts to the state legislature, governor and public. The state newspapers supported the program vigorously, as a result of basic facts given them by the highway department and of an analysis and presentation prepared by a disinterested outside staff headed by G. Donald Kennedy of the Automotive Safety Foundation.

Specifically the facts showed that plans and right-of-way were ready to go ahead on a large program. This fact helped fight powerful opposing interests which claimed that the state was not prepared. An interim committee of the state legislature toured the state, creating local publicity.

No one forsaw the magnitude of the opposition, which ran big paid ads toward the last of the campaign. But the facts presented were so conclusive and understandable that the program won [Aug. '47 R and S]. The established integrity and high reputation of the division of highways was a big factor in the outcome.

Mr. Kennedy dwelt on the California study as an instrument of public relations. This study was only one

of many activities in a 3-year struggle. It was specifically planned for the time and the need—an "interim" tool to supplement and not supplant the work of any standing public relations department. Such a department is vital, said Mr. Kennedy, and it should be manned by specialists who are not only writers but experts in radio, printing, etc. In the California instance the "outside" presentation represented merely an extension of fact gathering work carried on for years by the state-wide planning surveys.

Get Right Sponsor

Mr. Kennedy counseled highway departments to consider some of the basic "patterns" of the public relations job. There should be a sponsor for any program of public education —perhaps the legislature itself, or a road user group, or the state highway commission—depending on a shrewd decision as to what is likely to be most effective and acceptable to all.

Direction of the public relations program might stem from a legislative interim committee, or the state highway department. Funds may come from any of several legitimate sources. Public hearings are valuable in developing interest and working out relationships. The survey report, if easily read and visualized, becomes a major instrument of public relations, as does the highway program itself.

"3-Legged Stool"

Mr. Watkins contributed the idea that good relationship between the highway department and the contractors is important in advancing the road cause. In fact the department, the contractors and the material suppliers constitute a three-legged stool, and working harmoniously can help the program go forward soundly. In Kentucky the practice is to call in contractors and suppliers early so that they will have four or five months in which to get set for bids on work coming up.

Giving contractors a waiver or extension before they asked for it, as done recently to offset unusually bad weather, was cited by Mr. Watkins as a further example of the Kentucky attitude which has paid dividends [See editorial on this in Oct. '47 R and S]. The value of harmony was shown two years ago when a constitutional "no diversion" amendment was passed 4 to 1.

Mr. Perry questioned whether full use is being made of friendly people outside the highway department—perhaps a citizen's commission, the advertising departments of commercial firms, etc. Where a state's funds are limited and a large paid public relation staff might be criticized, this avenue might be especially important.

Mr. Ballard of Maryland in discussion pointed out that today there is only *one* community—local groups of farmers, city dwellers, businessmen, alike are in it and must make their contribution toward a common need of better transportation that will benefit all.

How to bring highway user groups into a harmonious cooperation on highway program promotion, was discussed at length. All agreed that such opposition has been a serious obstacle. In California and elsewhere at times all user groups have agreed on the need, but none are willing to pay.

Among other miscellaneous thoughts in discussion: No one can present a program properly to the legislature without a year or more of preparation.

Just what activities of a public relations nature are legally permissible, came in for clarification. It was emphasized that the compiling of facts in a form that will aid public relations, is a legitimate extension of the fact finding work now done under PRA and state highway direction.

Should Engineer "Sell"?

Should a highway department chief play neutral, simply presenting the cold facts, or take sides? Mr. Purcell of California counseled highway chiefs to express themselves to their legislatures when asked, since highway departments are supposed to have the information as part of their duties. Mr. Kennedy again emphasized that legislators if honest are seeking clean honest *facts*, and that highway authorities should give them the facts. Once this is done, it won't be hard for legislators to act in the public interest. Mr. Watkins of Kentucky added that it is the highway leader's duty to take a positive position in the best interest of his state, without false modesty.

Some 25 state highway departments presently have some kind of a public relations staff on the public payroll, this meeting brought out. Chairman Miller, in summing up, observed that no man's opinions are any better than his facts—which in this reporter's humble opinion might well be taken as the guiding philosophy of all future efforts to enlist public support of highway programs.

•

A new tonnage record appears certain for the trucking industry this year. According to the American Trucking Associations, Inc., its tonnage index is at 198 for the first eight months of 1947, compared to 182 for the same period last year. The index is based on 100 for the three years, 1938 through 1940.

•

Off-Street Parking—According to a report of the International City Managers' Association out of 875 cities surveyed, 345 now have one or more off-street parking lots in operation. Less than 20 cities charge for parking. Sixty-five cities opened new facilities last year.

See You at ARBA Convention

January 26-28, 1948, is the time (Monday through Wednesday), Washington, D. C., is the place—with the Statler, Willard and Mayflower hotels designated as the official headquarters.

The American Road Builders' Association Convention is in many respects the most important to the most people in the highway industry and profession. It's your convention.

Charley Upham, Tom Calloway and staff have a swell program. It will be headlined by nationally prominent speakers. Under the chairmanship of H. F. Clemmer a score or so of technical committees will hold sessions at the Mayflower.

There's to be a forum on soil stabilization, details not yet announced as we go to press.

The Contractors' Division will hold meetings at the Statler; the Airport Division, the Mayflower; the County Highway Officials' Division of ARBA, the American Institute of Local Highway Administration, and also the Planning and the Municipal division of ARBA will meet at the Willard (where the registration desk will be).

Get your reservation now and for the benefit of yourself, your organization and roadbuilding, take in this meeting which promises to be the best ever.

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Atomic Structure and Mechanism

By Halbert P. Gillette

ALTHOUGH five generations of scientists have studied atomic structure, no satisfactory theory exists as to the coherence of the corpuscles that comprise even the simplest atom.

The United Press recently reported the mobilization of scientists of 15 universities "for a frontal attack on the still-mysterious nucleus of the atom." Speaking of a proposed "nuclear furnace" it was added that "Scientists hope it will lead them to an understanding of basic atomic relationships which are today completely unexplained."

When 50 years ago J. J. Thompson experimentally discovered the electron and found that its mass was but a very small fraction of that of the hydrogen atom, it seemed that before long the structure and cause of coherence of atoms would become known. When in 1912 Rutherford announced his electron orbital theory the problem apparently verged on solution. But a series of discoveries about 20 years later blasted the hopes that Thompson and Rutherford had aroused. I refer to the discoveries of corpuscles called deutrons, neutrons, positrons and mesons. Thenceforth the mystery of atomic coherence seemed even more profound than before.

Rutherford's theory calls for a positively charged nucleus of the hydrogen atom around which one negatively charged electron revolves like the moon around the earth. Instead of gravitation, electrical attraction holds them together. The positive nucleus, called a proton, has a mass about 1840 times that of the electron, and a radius that is supposed to be about 1/100,000 that of the electron's orbit. So long as an electron remains orbital, the hydrogen atom is electrically neutral; but upon ejection of the lone electron, the positive charge of the proton is disclosed, and is found to be exactly equal to the negative charge of the electron. A very queer hypothetical pair, indeed!

In 1815 William Prout inferred that hydrogen atoms are "building blocks" of which other atoms are composed. His inference was based on the fact that the atomic weights of the lightest atoms were all nearly integral multiples of that of hydrogen. His theory did not win much acceptance until Thompson discovered the electron, for accurate weighing of atoms had disclosed many wide departures from the commensurability that Prout had assumed. T. B. A. Dumas suggested in 1826 that "the primordial atom might not be the hydrogen atom, but a smaller atom having only ½ or ¼ of the mass of the hydrogen atom." But in the absence of experimental evidence of even one subatom, Dumas' correct inference long went unheeded.

In the present article it is indicated that the neutral hydrogen atom is composed of orbital pairs of positive and negative corpuscles whose mass ratio is two to one. The positive corpuscle will be called a vitron, because vitrum (Latin for glass) becomes positively charged when rubbed with silk. The negative corpuscle, electron, was long ago given its name because electrum (Latin for amber) becomes negatively charged by rubbing with flannel. An orbital pair of a vitron and an electron will be called a magnetoid because it must have magnetic properties.

An orbital pair of masses revolves around their common center of mass at distances therefrom that are inversely proportional to their masses. Hence their kinetic energies are equal. If they are equally charged the magnetic forces developed by their orbital motions are proportional to their velocities, hence inversely proportional to their masses. Therefore if an orbital electron has half the mass of a vitron it has twice its magnetic force. It was this principle that led me to see that Barnett's "gyroscopic anomaly" indicates the existence of orbital pairs like those just described.

Prof. S. J. Barnett assumed that the elementary magneton is Rutherford's neutral atom of hydrogen, and that iron abounds in magnetons that are easily oriented by magnetic force. He reasoned that rapid rotation of a cylinder of iron around its axis would gyroscopically orient some of the magnetons and thus convert it into a magnet as long as it rotated. In 1914 he succeeded in thus producing gyromagnetism. This was a remarkable experimental achievement based on two physical theories. But to his great surprise (U C L A Acad. Pub., 1930), the magnetism thus induced was much less than theory had led him to expect. He said: "One of the most important results of the investigation is the magnitude obtained for the gyromagnetic ratio, which, as stated above, is about one-half the value for an electron moving in an orbit. This radical discrepancy has become known as the gyromagnetic anomaly." By assuming axial spin of the electron and by other assumptions, Barnett tried to explain the anomaly.

But there is another explanation that has more than the merit of much greater simplicity. It begins by denying that there is only one orbital pair of positive and negative corpuscles in a hydrogen atom, and by inferring that there are numerous orbital pairs. Since this inference explains Barnett's anomaly, it rests on experimental data, and is not "ad hoc." Since the orbital magnetoid thus inferred has a mass of 3 electrons, and since the atom of hydrogen has a mass of about 1840 electrons, there are more than 600 magnetoids in an atom of hydrogen. Let one of them eject one of its electrons and there exists in the atom an un-neutralized positive charge equal to that of the emitted electron.

For reasons above given the magnetic force of a magnetoid is that by which the orbital electron exceeds the slower moving vitron in magnetic force. Given such magnetic forces in an atom of hydrogen, appreciable only at very short distances, and there obviously exist means by which the 600 and more magnetoids cohere.

Unless Newton's law of gravitation breaks down at subatomic distances, no known attractive forces but magnetic and electrical forces are capable of producing coherence of subatomic and atomic corpuscles. So long as the Rutherford theory is accepted as sound, no solution of the coherence problem seems possible. Discard that theory, and a solution of the problem presents itself for consideration—the orbital vitron-electron theory, or, if you prefer, hypothesis.

Let there be 600 or more such orbital pairs in an atom of hydrogen, and it seems likely that they exist in a series of concentric shells; for these would take the place of Bohr's "permissible orbits" between which he assumed that electrons jumped to and fro when producing radiant waves. Because he deduced a few wavelengths by this assumption as to the mechanism of the Rutherford atom, Bohr's theory has some basis of fact;

but it need not involve either a mono-electron atom of hydrogen or orbital motion of the electron around the center of the atom as assumed by him.

If all atoms are composed of hydrogen atoms that have lost some of their subatoms during the process of uniting, then every atom and, of course, every molecule, is a complex system of magnetoids. The accepted theory of molecular magnetism calls for orientation of orbitally rotating electrons so that their fields do not neutralize but assist one another. Applying this theory to orbital vitron-electron pairs, it follows that all matter may become magnetic by magnetoid orientation. If so, chemical attraction is probably due to mutually induced orientation of magnetoids in atoms. Then, of course, it is induced orientation that magnetically binds 4 atoms of hydrogen into one of helium, 12 into one of carbon, 14 into one of nitrogen, 16 into one of oxygen, and so on. This is equivalent to saying that there is no basic difference between a hydrogen-compounded atom and a molecule composed of two or more atoms.

A century and a quarter ago it was discovered that platinum absorbs certain gases and imparts chemical activity to them. For example, hydrogen thus occluded will unite with atmospheric oxygen, producing molecules of water, accompanied with evolution of heat. Yet the platinum remains chemically unaltered. This and other catalytic phenomena have had no satisfactory explanation. But the theory here presented indicates that the catalyst (e.g., platinum) has magnetoids so oriented in dense groups that they induce orientation of magnetoids in certain atoms to a degree that not only attracts them toward the catalyst but toward certain other atoms with which they unite chemically.

Photosynthesis seems to result from orientation of magnetoids by waves of light, until mutual magnetic attraction between adjacent atoms generates molecules.

There are many micro-distance phenomena whose causes have remained mysterious. To call such forces molecular or atomic adds nothing to the understanding of their basic nature. The following are some of the phenomena that may owe their existence to induced orientation of magnetoids: Cohesion, adhesion, capillarity, surface tension, ionic condensation of moisture, contact charging, etc.

Prof. P. W. Bridgman won a Nobel prize for effects produced by extremely great hydrostatic pressure. Not only was shearing strength of numerous substances greatly increased, but so was chemical affinity in many instances. Neither of these effects has been satisfactorily explained, but both find plausible explanation if there are magnetoids such as above described; for great pressure would probably increase their orientability so as to increase both cohesion and chemical attraction. In that event magnetic susceptibility would also be affected, possibly to such a degree as to offset the effects of heating. In fact I think it not unlikely that, under the stupendous pressure in the sun's core compound atoms may be generated by synthesis of atoms of hydrogen. The greatest pressure thus far produced in Bridgman's ingenious experiments is about 6,000,000 pounds per square inch, which is about that in the Earth at a depth of 1000 miles. He himself has suggested that unusual chemical compounds may exist in the core of the Earth.

That certain atoms contain vast stores of internal energy has been known since the discovery of radium in 1903 by the Curies. That was two years prior to Einstein's publication of his relativity hypothesis from which he deduced that internal energy equals mass multiplied by the square of the velocity of light—a formula still without experimental or observational confirmation. Einstein also inferred that matter is convertible into energy, which likewise lacks experimental proof.

The theory above outlined indicates that the internal energy of an atom is nothing else than the kinetic and potential energy of the vitrons and electrons of which it is composed.

What part, if any, ether plays in radiation is debatable, although nearly all physicists agree with Einstein that it is non-existent. But if that supposition is right, it will be the first time in scientific history that a "false" theory (that of ether) has yielded a vast harvest of discoveries; whereas a "true" theory (that of relativity) has remained fruitless for two generations though cultivated by many scientists who believed in it.

Writers on the atomic bomb have repeatedly attributed to Einstein credit that belonged to others; as, for example, Becquerel, who in 1896 discovered that uranium emitted radiant energy that resembled X-rays. It was he who suggested to the Curies the search for radiant atoms that culminated in their discovery of radium, which later came to be recognized as a product of the automatic disintegration of uranium.

In a recent article on the synchrotron we read: "Einstein predicted relativity-mass many years ago. He calculated that the speed of any particle can never exceed the speed of light. As it aproaches that speed its mass increases until all acceleration stops. Physicists today know that Einstein's predictions were accurate. An electron with a 300,000,000-volt push behind it is 600 times heavier than normal." The interpretation thus made of the failure to achieve equal accelerations of electrons by equal impulses of magnetic energy is not the only possible interpretation nor the simplest. Radiant waves exert a push on electrons, but as the velocity of the electron increases such a push becomes less and less effective until when the electron attains the velocity of a light wave, the pursuing wave exerts no push at all. That is not the Einstein theory, for his relativity postulate leads to the inference that the mass of the electron increases with its velocity. But let the magnetic force that impels an electron in a synchrotron be radiant waves, and it follows that although the mass of the electron remains constant, its acceleration becomes less and less as it enters, with increasing velocity, any impelling magnetic field.

Einstein's relativity theory admits no such thing as force, but grotesquely infers induced "curvature of space-time" as the cause of all acceleration. It asserts wave-like changes in space-time curvature, yet assigns to a space-time continuum no conceivability. Indeed his celebrated treatise on Relativity (p. 9) says: "In the first place, we entirely shun the vague word space, of which, we must honestly acknowledge, we cannot form the slightest conception." Then on page 135 he ceases shunning what he had called inconceivable, for he says: "According to the general theory of relativity, the geometrical properties of space are not independent, but are determined by matter." So the rejected block becomes the corner-stone of the temple of Relativity.

Mathematical physicists have almost silenced all objectors to Einstein's relativity, mainly because it seems preposterous for one not versed in the highest of higher mathematics to express a doubt as to its inferences. It seems not to be generally known that his theory starts with a "relativity postulate" that is as bald an assumption as ever a brain conceived. One evidence of the soundness of conclusions from a postulate must be either an experimental or an observational agreement with the inferences closer than is attainable by any other hypothesis. His two best "proofs" relate to the motion of Mercury's perihelion, and the deflection of starlight toward the sun. But

(*Continued on page* 119)

Better Equipment Will Mean More Economical Road Building

By Charles M. Upham

Engineer-Director, American Road Builders' Association
Washington, D. C.

WITH labor 50% higher than in prewar times, and with equipment and materials in short supply, road building costs have greatly increased. To meet this, road builders are relying more and more on machinery.

Earth-moving offers a striking example of saving and efficiency. In the days of hand labor and animal power, common excavation cost more than 40 cents a cubic yard. In 1924, beginning of the gasoline period of mechanization, 39 cents was the average bid price, according to a Public Roads Administration table.

The table shows the cost of earth-moving by years from 1924 forward. While the period covered includes the depression with low labor costs, it cannot be denied that newly developed machinery played an important part in reducing earth-moving charges.

At the beginning of the diesel era in 1928, this cost per yard had gone down to 34 cents. In 1934, after the depression had lifted, the cost had been further reduced to 29 cents.

Following the gasoline and diesel periods came a season of refinement of design and increased capacity lasting from 1934 up to World War II. Tractor-drawn trailers hauled 10 to 12 times the load of the 1½-yd. horse-drawn wagon, and at twice the speed. Engine mounted and power-operated elevating graders delivered many times as much earth as previous models powered from the bull wheel.

46% Reduction

These and other advancements in operation made themselves felt. By 1940, although a slight effect from the depression was still felt, the cost of moving a cubic yard of earth was 21 cents—a 46.1% reduction in 16 years since the mule-and-drag-pan days.

During the later prewar years, changes in machines, methods and management were so rapid that their importance was scarcely realized by many engaged in the industry. The story of the evolution of various types of equipment cannot be told here; but the development of the scraper offers an interesting case in point.

In the period before 1923, the era of animal power, 4-horse Fresnos handled up to 4.3 yd. per hour at a haul of 350 ft., and 2-horse wheelers 2.85 yd. up to 800 ft.

During the gasoline era, 1924-1928, 3-1½ yd. wheelers with 60 hp. tractor handled 22.4 yd. an hour at a haul of 800 ft. In the diesel era which followed, 1928-1934, a 5-cu. yd. land leveller with 65 hp. tractor handled 62 yd. an hour at 400 ft. A 4-2 yd. wheeler with 75 hp. tractor moved 31 cu. yd. an hour with a 900 ft. haul.

In the final prewar stage, 1934-1940, 14 cu. yd. carry type scrapers with 95 hp. tractors moved 53 yd. per hour with a 1500 ft. haul, while a 23 cu. yd. scraper, with 95 hp. tractor and pusher, moved 68 yd. per hour with a 2000 ft. haul. It will be observed that the scrapers of 1940 delivered 46 times as much earth at 800 ft. as was moved (per unit) prior to 1924. Furthermore the economic length of haul for scrapers increased from 600 ft. to 2,500 ft. This is important because the average length of haul in 1940 grading operations was twice that required prior to the age of mechanical equipment.

More Progress Due

It must be remembered that all these advances mentioned came before World War II. During the war years, the pressing need for speed and efficiency in earth-moving and all phases of road building called for the highest ingenuity and scientific skill of the equipment manufacturers. Out of the war has come highway construction machinery which is revolutionary in the prodigious tasks it can accomplish.

The influence of mechanization on road building costs will be exemplified to a remarkable degree at the 1948 Road Show in Chicago. It will be larger both in area and exhibits and have more exhibitors than at any previous show. But it will also have a new note to give it added distinction.

At road shows of the past, the majority of the visitors were mechanical men sent by highway departments, contractors and other equipment users to acquire what was needed. This was little different from a man going into a hardware store to buy a stump puller or a keg of 10-penny nails.

Realizing that to meet the threat of rising prices they must take advantage of every efficiency and economy, engineers, manufacturers and contractors have been working together to develop equipment that will give the travelling public better highway facilities for its invested dollar. The results of these years of planning, research and investigation will be proudly unveiled by the manufacturers at this Soldier Field exposition, July 16-24, 1948.

"New" Attraction

It will not be a case of attending to pick up a particular piece of equipment but it will be the "What's new?" that will exercise a pull on everybody in the industry and profession. There will be much to interest highway engineers, executives, designers, technicians and "the men on the job" as well as the mechanics.

Even greater improvements and developments in all road building equipment may well be expected in the interval between 1940 and 1948. And this is the first road show in eight years. Everyone connected with road building is therefore awaiting this event with keen expectancy—the manufacturers for the opportunity to display their lines before the greatest assembly of road builders ever known, road builders for the chance to see a veritable "show of wonders" in their particular field.

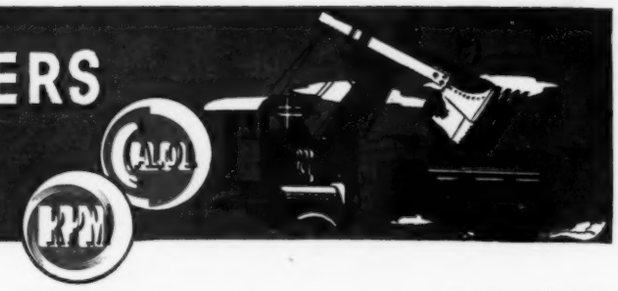
A contributing factor to the strides made in producing better and more efficient road building equipment has been the work of the joint committee on construction equipment of the American Road Builders' Association and the Highway Research Board. This group, organized in 1936, has held four important meetings in the past eighteen months, and has done much toward getting the manufacturers, contractors and engineers together on a plane where the needs and requirements of the industry might be studied for the benefit of all.

Joint Committee Action

At the committee sessions, the contractors discussed the requirements of their jobs with the manufacturers; the manufacturers told their plans

(*Continued on page* 107)

STANDARD ENGINEERS NOTEBOOK



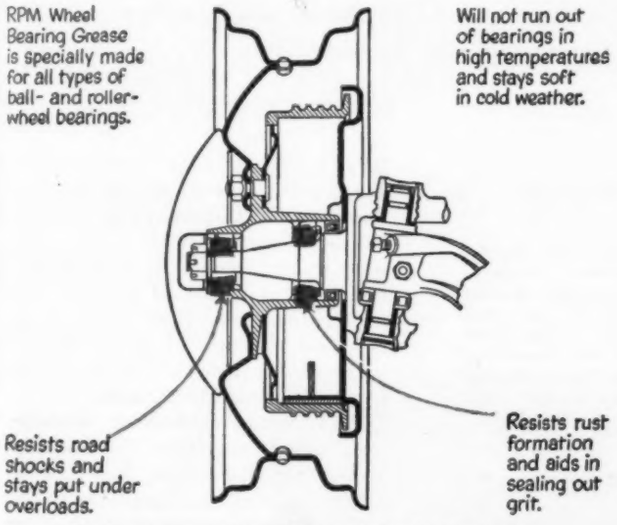
Shock-resisting grease lengthens bearing life

To prevent extra wear and the necessity for replacing wheel bearings during the life of a vehicle, service them regularly with RPM Wheel Bearing Grease.

A short fibre lubricant, specially made for both ball, and roller wheel bearings, RPM Wheel Bearing Grease does not melt and throw out of bearings during hot operating conditions. It feeds slowly from bearing reservoirs and provides thorough lubrication for prolonged periods.

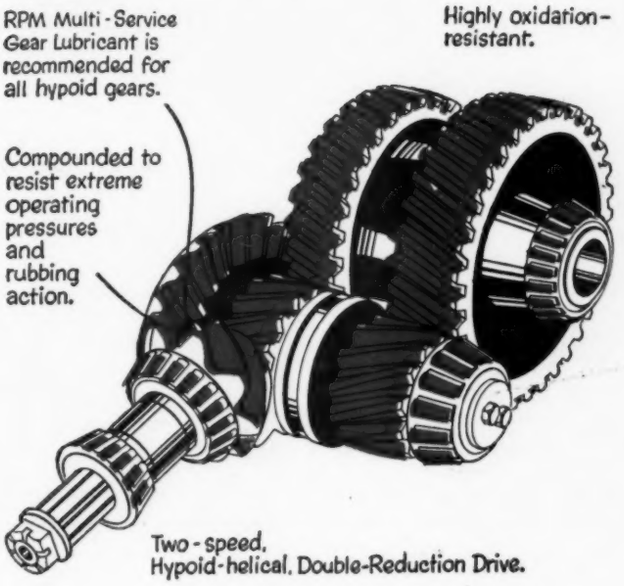
RPM Wheel Bearing Grease has the unusual ability of reducing the pounding of road shocks imposed on wheel bearings. It cushions the force of these shocks, minimizes metal fatigue and overheating and reduces vibration.

Extremely adhesive, RPM Wheel Bearing Grease helps maintain a seal around bearings against corrosive moisture. This seal also aids in keeping dust and grit out of bearings.


RPM Wheel Bearing Grease is specially made for all types of ball- and roller-wheel bearings.
Will not run out of bearings in high temperatures and stays soft in cold weather.
Resists road shocks and stays put under overloads.
Resists rust formation and aids in sealing out grit.

This drawing prepared with cooperation of Timken Roller Bearing Co.

Trademarks, "Calol," "RPM," Reg. U. S. Pat. Off.


RPM Multi-Service Gear Lubricant is recommended for all hypoid gears.
Highly oxidation-resistant.
Compounded to resist extreme operating pressures and rubbing action.
Two-speed, Hypoid-helical, Double-Reduction Drive.

New lubricant can be used in all type gears

The drive gears in automotive equipment operating under the most severe conditions are fully protected by newly-developed RPM Multi-Service Gear Lubricant. It resists the tremendous pressures and extreme temperatures encountered in hypoids as well as in heavily loaded conventional gears.

Special compounds in RPM Multi-Service Gear Lubricant react on tooth bearing surfaces and provide a safety coating. They also give the lubricant maximum resistance to foaming, better resistance to oxidation, and provide better protection from corrosion. The compounds are very stable in the blend and will not drop out of solution.

RPM Multi-Service Gear Lubricant is approved by the Timken Detroit Axle Co. and Buick Motor Division, General Motors Corp. for service use in hypoids, and the Army Ordnance Dept. as conforming to U. S. A. Specification 2-105-B. It is made in four grades: SAE 75 (for Alaska only), 80, 90 and 140.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Colo.; Standard Oil Company of Texas, El Paso, Texas.

FOR EVERY NEED A STANDARD OF CALIFORNIA JOB-PROVED PRODUCT

★ Rotary half-way up Loveland Pass, widening during clear mild weather following a storm. Note height of snow-wall maintained on outer shoulder of shelf road, for protection to motorists

Plowing a Colorado Pass

Notes and photos by the R. and S. editor last January over Loveland Pass

★ One of the two sand bins located part way up the pass

★ One of several sand spinners working on the lower reaches of the pass. Fast travelling sanding units put quickly on the road during emergency periods have greatly reduced the hazard of wintertime travel, and mechanical spreaders are considered indispensable time and labor savers

LIKE other main mountain-pass highways in Colorado, Loveland Pass, west of Denver, (U.S. 6 and 40) has been kept open all winter in recent years. And this in spite of a maximum elevation of 1,900 ft. Last winter there was little snow on this pass until towards spring when the highway department men finally had a real fight on their hands.

These scenes were taken January 3, 1947. Sky cloudless. Temperature —30 F. previous night, 5 to 20 above at time of photos. Exceptionally light snowfall, snow powdery. These photos, however, show some of the routine but interesting details of plowing which enable the crew to keep ahead of any but the very worst storms. There are two crews, each operating from an equipment garage part way up the pass but below the

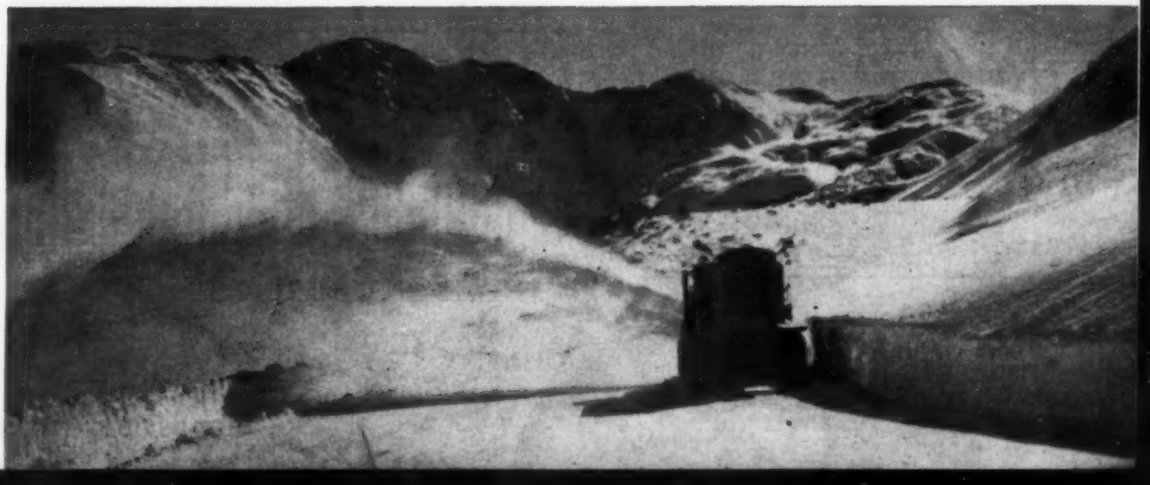
★ Chains take a real beating on pass work

★ A one-way plow is widening along outer shoulder of a shelf, and rotary is cleaning up the windrow which has been left on solid ground safely inward from the "unknown" area pioneered by the truck

★ Starting upward toward Loveland Pass out of Denver

★ Warning signs at beginning of highest part of pass road

★ A team of medium one-way units widening. Note mat of packed snow left in roadway, rather than attempt to keep the black-top pavement scraped clean without aid of thawing



★ Widening on inner side of shelf, and throwing with the wind entirely across the cleared roadway. Continental Divide (El. 13,500 ft.) in background

steepest or summit section. Equipment utilized is variable, being taken from a reservoir of 36 heavy-duty units operated by the department throughout this division, half of the division's 700 miles being mountain roads requiring considerable snow clearing.

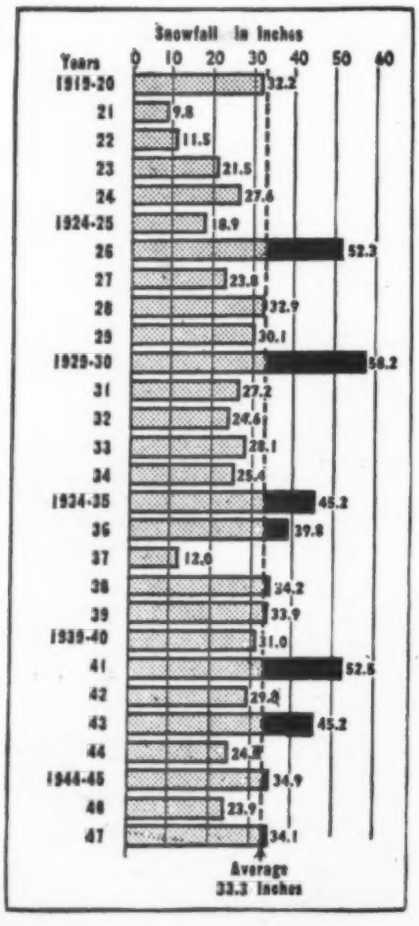
One rotary is kept on the pass at all times and is usually accompanied by three plows working in staggered formation.

Heavy Snow This Winter?

FREAK weather has been the rule throughout much of the United States this past winter and summer. Summer was a blistering, humid one for the midwest and east, and road-building was severely retarded until late season by an abnormal number of rainy days.

But the winter pattern is the interesting thing right now. Last winter began with early-season freak snow storms in Southern California, eastern Colorado and elsewhere. North-central states got hit in mid-winter, culminating in Milwaukee's 18-in. snowfall with high wind (R and S, May '47). The Northeast, scene of the heaviest wide-spread snow blanket in the U. S. next to the Upper peninsula of Michigan, on the other hand enjoyed easy winter with little snow, only to wind up with a "terrific" plowing job in March and April.

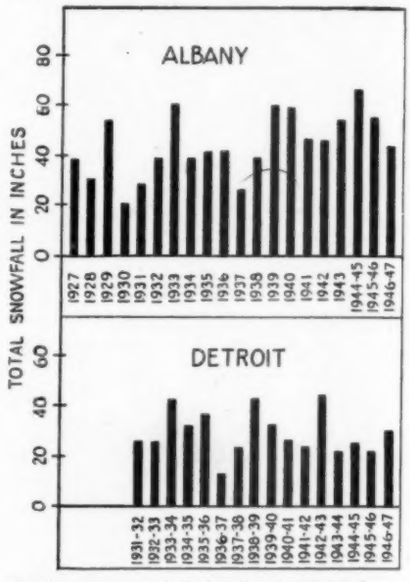
All of which prompted us to dig into the snowfall records of a few of our heavy-snow cities. Without attempting to draw any conclusions as to weather cycles, or forecast for the coming winter, we present herewith data supplied by several northern cities. Of course the number of inches total snowfall isn't half the story, highway and municipal departments being most concerned about other patterns such as temperature, freeze-thaw cycles, wind velocity, depth on ground, etc. But in general reports indicate that a record expenditure is contemplated for snow and ice control, as a combined result of inflated dollar values and the requirements of all-time-high winter traffic.



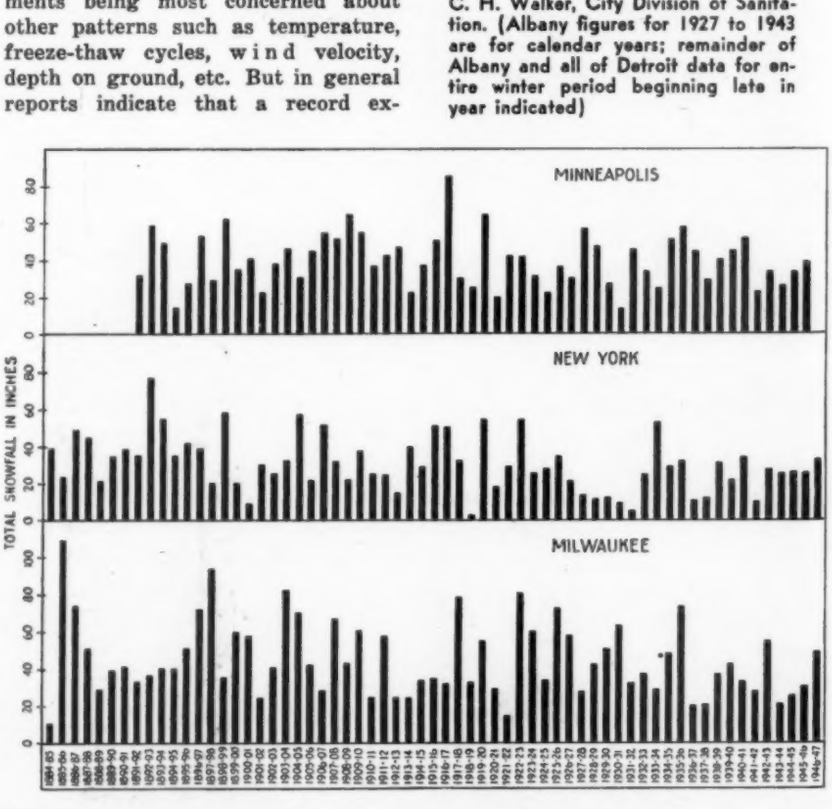
★ Chicago's average of 33.3 inches means nothing. Annual snowfall has varied from 12 to 64 in. (latter 1917-18). Chart courtesy "Chicago Tribune"

Chicago Adds Snow Equipment

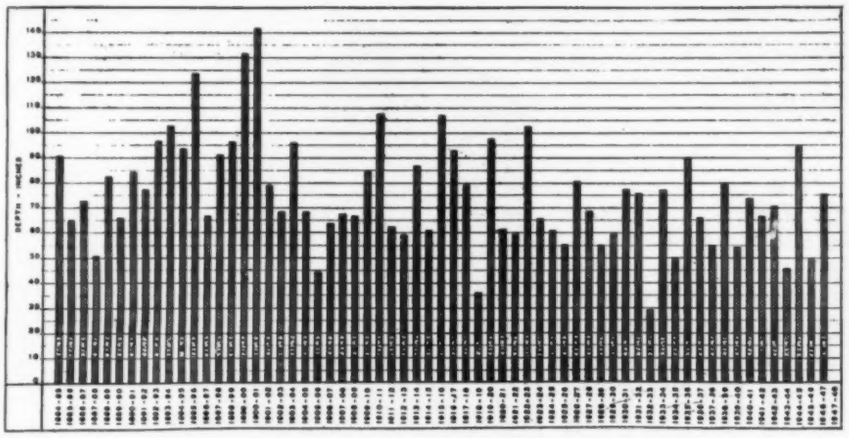
The city of Chicago recently received delivery on three newest type



★ Albany's snowfall total varies less from year to year, percentage-wise, than that of many other cities. Data courtesy Commissioner Marsh. Detroit is a city of relatively light snowfall, according to figures from Superintendent C. H. Walker, City Division of Sanitation. (Albany figures for 1927 to 1943 are for calendar years; remainder of Albany and all of Detroit data for entire winter period beginning late in year indicated)



★ Minneapolis data from weather bureau; New York City data from Commissioner William J. Powell, Department of Sanitation; Milwaukee data from Walter M. Swietlik, Commissioner of Public Works



★ Rochester's long-time trend in snow depth is slightly downward, but as shown here that means nothing. The city has appropriated $825,000 for snow and ice cleaning, according to Comm. of P.W. August H. Wagener —$675,000 for roadway plowing, chlorides and sanding and $150,000 for walks. Up $75,000 from last winter

snow loaders, the first such equipment this city has ever owned. The machines will be concentrated in the downtown area in worst storms, according to Lloyd M. Johnson, commissioner of streets and electricity.

Orders were to be placed by late summer, also, for 49 new snow plow attachments for refuse trucks, plus snow blades for the city's 15 power weed cutters, these units to be assigned to safety islands and intersections.

Chicago finances snow removal from it's regular street cleaning fund, which amounts to about eight million dollars this year. According to a news report quoting street department figures for the last 22 years, Chicago has spent $3,708,000 on snow plowing and removal, or an average of $168,500 a year, with peak years above $400,000.

●

E. E. Hickok Is Dead

Elbert Eugene Hickok, known to a wide circle of friends and acquaintances as "Gene," was killed in a hit and run accident on Oct. 9, 1947 in Denver, Colo., where he had been living since 1942. Mr. Hickok was born in Missouri 72 years ago. For the last 44 years he had been associated with the A. Leschen & Sons Rope Co. of St. Louis, although for the past few years he had been on the retired list. During his long active service with the Leschen Co. he sold wire rope in the states of Iowa, Minnesota, Wisconsin and Michigan.

●

U. S. Has 75% of All Motor Vehicles—Of the 45,000,000 motor vehicles in use throughout the world in 1946, nearly 34,000,000 were in the United States.

ARBA Official Nominees for 1948

J. T. Calloway of Chicago has been nominated for re-election as president of the American Road Builders' Association for 1948. Nominations by an association nominating committee and any nominations made by petition are to be voted on by the membership. Other official nominees:

Vice-Presidents: Paul B. Reinhold, pres., Atlas Equipment Co., Pittsburgh; Charles W. Smith, pres., Smith Engineering and Construction Co., Pensacola, Fla.; W. A. Roberts, vice-pres., Allis-Chalmers Mfg. Co., Milwaukee; T. E. Stanton, materials and research engineer, California Division of Highways.

Treasurer—H. C. Whitehurst, director of highways, District of Columbia, Washington.

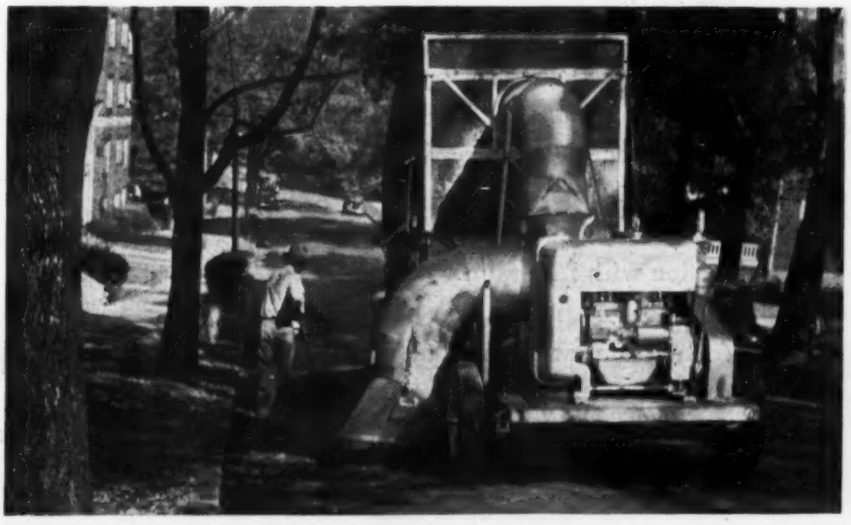
Directors (Term ending 1951)—Edgar J. Buttenheim, publisher, Contractors and Engineers Monthly, N. Y.; T. H. Cutler, Chief Engineer, Kentucky Department of Highways, Frankfort, Ky.; Edward S. Gillette, Publisher, Roads and Streets, Chicago; Otto S. Hess, Engineer-Manager, Kent County Road Commission, Grand Rapids, Mich.; Howard R. Meeker, Pres., J. D. Adams Co., Indianapolis, Ind.; Charles M. Noble, State Highway Engineer of New Jersey, Trenton, N. J.; Murray D. Shaffer, Director of Highways of Ohio, Columbus, Ohio.

●

Another Suction Leaf Loader

Another on the growing list of cities now tackling leaf loading mechanically is Birmingham, Ala. This city's municipal shop force working under L. D. Merrill, superintendent of streets and garbage, recently built the units pictured herewith. Two trucks were each equipped with a demountable box-shaped cage to hold leaves. This cage, which sets in the truck bed, is made up of wire mesh and "hardware cloth" tarpaulin stretched over a light steel cage. Each cage holds about 15 cu. yd. of leaves.

One of the trucks is shown here. Attached to it is a small-rubber-tired trailer, on which is mounted a 40-hp. gasoline motor and a suction unit. Leaves are picked up alongside the machine and blown into the cage through a hole in the rear wall. When one truck is filled, it heads for the disposal site while the other truck is attached to the trailer, and the blower thus is kept going steadily. J. W. Morgan is commissioner of public improvements at Birmingham.



★ Showing Birmingham's new shop-assembled leaf loader on a try-out run this past autumn

"You Can Say That Again . . .

MACKS LAST LONGER"

One of ten Mack Model LJ dumpers recently delivered to Rusciano & Son Corp., New York, N. Y.

MENTION Mack long life to Rusciano & Son Corp., New York contractors, and they'll tell you, "You can say that again."

They bought their first Mack way back in 1925. Today, close to a quarter-century later, this truck is still giving profitable service — a four-cylinder veteran of countless dependable hauls.

Rusciano's latest repeat order for ten big Mack dumpers underscores this company's long-time satisfaction with Mack durability and long life.

Like numerous other successful contractors, they've found that year-in, year-out, there's nothing to equal a Mack when it comes to working harder, lasting longer and operating at lower cost.

It all adds up to this: You get more work *out* of a Mack truck because more work goes *into* the making of a Mack.

Mack

since 1900, America's hardest-working truck

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada, Mack Trucks of Canada, Ltd.

Trucks for every purpose

6189

Mobile Machine Shops

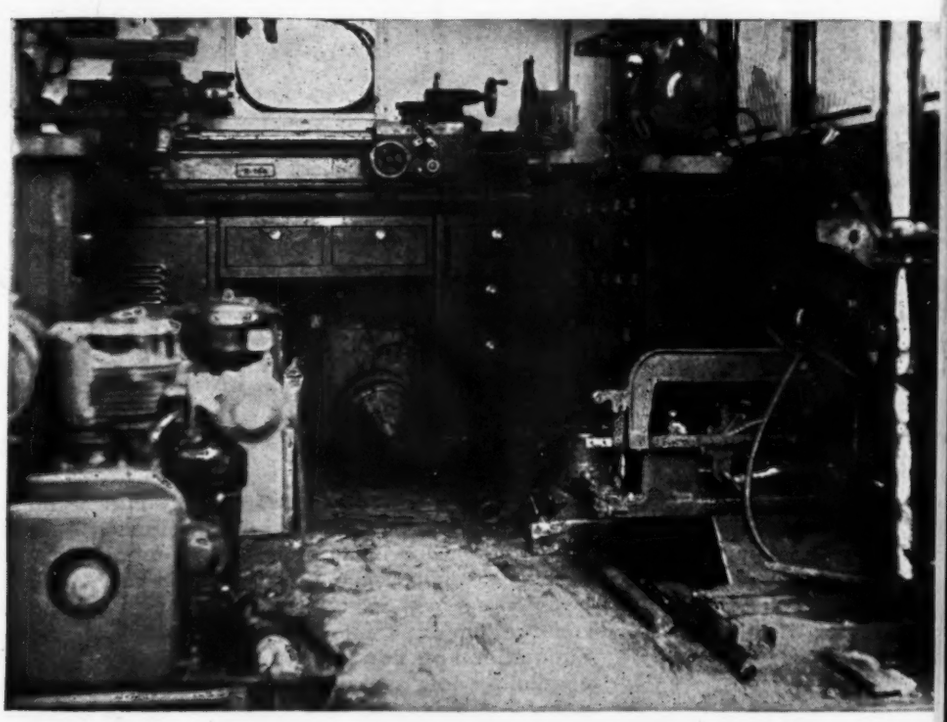
This Southern Road Contractor Has Employed Them for Twenty Years

SENDING machine shop equipment out to road jobs on rubber tires isn't a new idea, but still it's not something seen every day in highway contracting work. We've run across several well equipped "shop trucks," recalling especially the fleet of mobile service and shop equipment employed by A. Gutherie of St. Paul on a Minnesota project [Aug. '45, R&S].

Latest and possibly the best equipped mobile machine shops suitable for highway work to come to our attention are the two units now serving Duval Engineering & Contracting Co., of Jacksonville, Florida. Assembled by shop superintendent O. A. Price and his mechanics, the two outfits here pictured are but the latest in a succession of such trucks. The company has worn out several, according to Superintendent Price.

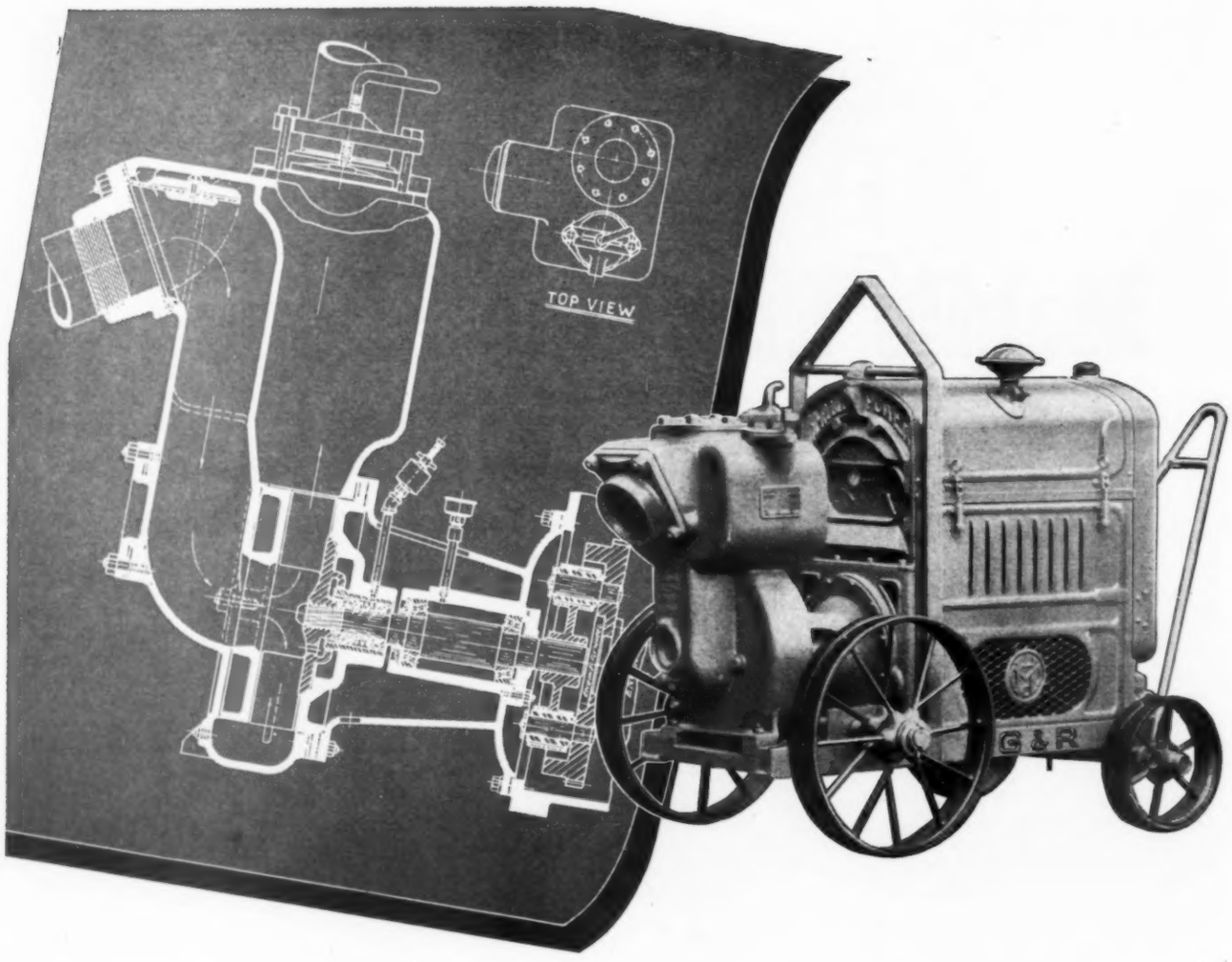
The heaviest of the two present units consists of a GMC 5-ton Army

★ Shop superintendent O. A. Price



★ Inside the rear-doored shop truck. See article for details

★ This six-by-six Army truck is loaded with machine shop equipment. Goes just about anywhere a tractor can go



MR. CONTRACTOR:- *The real story of pump value is found by examining the inside.*

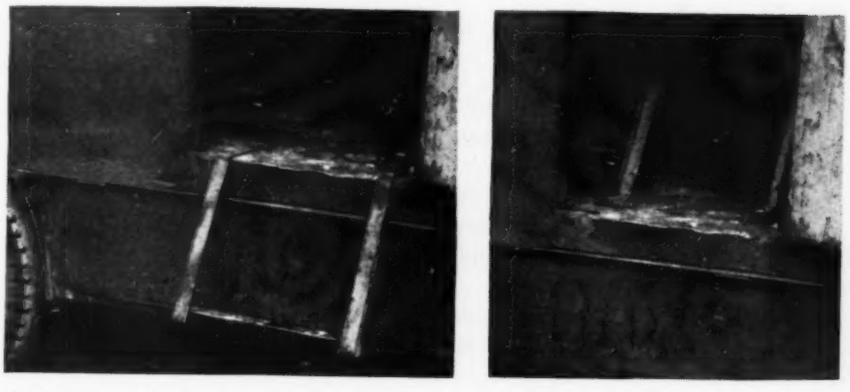
"HANDY" PUMP weighs only 20 lbs. Lifts up to 25 feet. Delivers 8 G.P.M. at 40 pounds pressure. Elec. motor driven. Send for literature.

It's the simplicity and good design that accounts for the outstanding performance of Gorman-Rupp self-priming, centrifugal pumps. They are the most efficient and trouble-free pumps you can buy and the reasons are built into the pumps:
Streamlined inside where streamlining counts. Smooth surfaces, no traps -- these pumps will handle any muck or solids that will pass the intake strainer. No by-passes, no pipes, no valves -- after initial prime there is nothing to do in priming but start the motor and you start the water. This greater priming simplicity pays off in more work for less power and fuel.

Impeller operates at motor speed without reduction gears -- eliminating another source of wear, trouble and maintenance. The impeller, rotating on high grade roller bearings, is the only moving part.
Every wearing part is easily replaceable. What little maintenance is necessary can be done by an unskilled man with common tools.
These are a few of the reasons why Gorman-Rupp centrifugal pumps will outperform and outlive any comparable equipment. We will be glad to place one in your hands and let you be the judge. Write your distributor for information.

THE GORMAN-RUPP COMPANY
GORMAN-RUPP PUMPS — UNSURPASSED FOR PUMPING FAST
323 N. BOWMAN STREET • MANSFIELD, OHIO

★ A somewhat lighter truck, also used by the Duval E and C Co., has a lathe and drill press for very small precision parts



★ Step for side door—in position for use, and up in clear for closing door while in transit

6 x 6 truck with windowed, weathertight steel body—ideal for the purpose since Florida has plenty of rainy weather, and precision tools need to be well housed. The 6 x 6 feature is important, too, because of prevailing soft or sandy terrain.

Steel cabinets for small parts are placed under benches along either inside wall. Across the front end is a bench on which is mounted a 10-in. lathe with 48-in. bed. Under the bench, more cabinet space, also of steel construction. Tucked into the remaining space are a drill press, grinder, bench vise and power hack saw, each with individual electric motor drive. Power for lights and tools is supplied from a 110-v. gasoline powered generator, which sets on the floor near the rear door and can be used to run equipment outside the truck. Electric lights with white reflectors are located in the ceiling, and outlet plugs are spaced at close intervals all along either sidewall, the cord serving the plugs being housed in a 1-in. steel pipe, located at bench-top height for convenience and accessibility.

As a special deluxe feature, the truck interior is cooled in hot weather, or the chill taken off in cold damp weather, by means of an air conditioning unit, built into the front wall near the ceiling. The conditioner with its own motor works from the generator, while the heating unit is fueled from a gas cylinder.

Second Unit Similar

The other of the two trucks is a 2½-ton outfit, also with weathertight body and having a small door in one side as well as a rear door. The side door is fitted with a hinged drop step, which is moved up into the car when the door is closed during transit. A very small but high grade bench lathe is mounted across the front wall, as with the other truck, this lathe being chosen specially for making the numerous small parts so often needed in a hurry. Other equipment comprises an electric welder (which serves also as generator for the other equipment), a smaller bench-type drill press in keeping with the small lathe, grinder; acetylene outfit; and enclosed steel parts cabinets.

The foregoing equipment works out of a headquarters shop at Jacksonville which is one of the most extensive and well equipped contractor's shops in the Southeast. Duval Engineering & Contracting Co., which has to its credit some $58,000,000 in war projects, today carries some five hundred pieces of equipment in inventory, including a hundred or so trucks. The mobile shops, while possibly too elaborate for a smaller contracting firm, fit well into Duval's state-wide pattern of highway and other work.

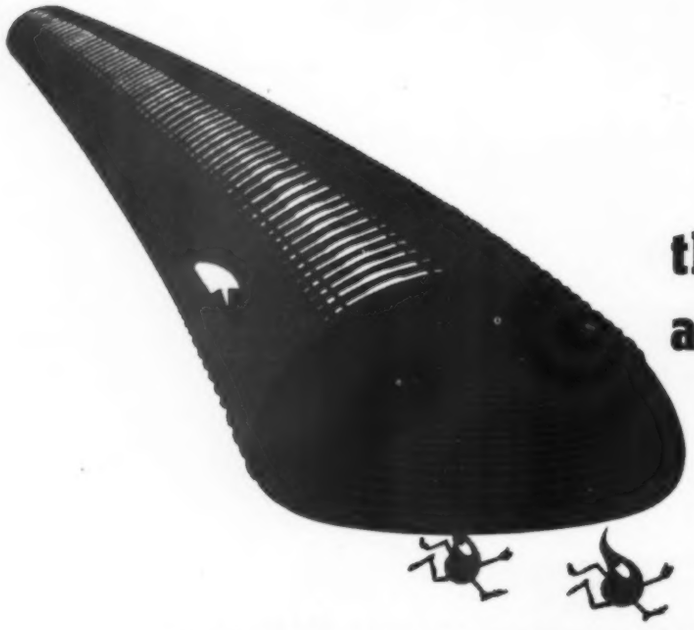
The advantages under such a setup of on-the-job precision machining service hardly need to be enumerated. The principal one is the avoidance of delays while waiting for parts during breakdowns. The mobile units also fit in well with the heavier repairs that are undertaken at the job.

Longer Life for Your Off-the-Road Tires

Condensed from off-the-road tire maintenance booklets put out by Firestone and B. F. Goodrich companies

FOR the first time since prewar days, tires of all types are again available without waiting. Prices are in reverse to the inflationary trend of most other products, with list prices approximately 2 to 4% lower than they were in 1941. But regardless of how many tires are on the market, proper care and maintenance of large off-the-road tires is important for they are far from inexpensive for the cost-watching contractor.

Prices on the largest size earthmoving, mining and quarrying service tires are nearly the same as they were in 1941. The June cut in price affected primarily passenger sizes and tractor sizes up to about 10.00-24 in.



this pipe says "SCAT" and means it!

Water doesn't hang around long when an ARMCO Pipe-Arch is on the job. That's because the greatest effective waterway area is in the bottom—right where it is needed for fast, unrestricted runoff.

You'll also find that ARMCO Pipe-Arches are the safe, practical answer to problems of limited headroom. They have ample strength under shallow cover to withstand the impact and vibration of heavy traffic. Costs are low because you get adequate drainage without raising the grade or installing several smaller openings. And with Pipe-Arch there is less excavation. The wide bottom "fits the ditch" —provides more bearing area for added safety on soft ground.

Installing ARMCO Pipe-Arch is easy. An unskilled crew can do an average job in less than an hour. Individual lengths are prefabricated and shipped as a complete unit. When necessary, they can be tightly joined by sturdy band couplers. Simple tools are all you need.

Once you use ARMCO Pipe-Arch you'll be convinced. These sturdy structures have all the advantages of full-round corrugated pipe plus a functional design that meets specific drainage requirements. Write for complete information. Armco Drainage & Metal Products, Inc., 2195 Curtis Street, Middletown, Ohio. Offices in principal cities.

ARMCO

ARMCO PIPE-ARCHES

Quality of off-the-road tires is equal to that of prewar tires and 100% crude rubber is again being used by the major rubber companies with synthetic rubber being used mainly in tubes.

Since an 18.00-24 tire of 20 plys costs over $500 it is still good sense to get all the possible wear out of it. In all work where hazardous conditions are continually present to hinder production, proper inflation, slow speeds, and careful planning of haulage routes can bring to a minimum the number of scuffed and cut tires.

Types of Tire Abuse

Damage to tires is frequently caused by careless drivers who speed their prime movers on the highway.

Or who jump their loads loose by bumping the rear wheels against an abutment.

Hitting large sharp rocks on the haul road doesn't add to tire life, either.

But wrong pressure is an even more common trouble. The Tire and Rim Association has prepared tables listing maximum speeds for any particular tire under every load condition. For example, an 18.00-24 twenty ply tire has a maximum rolling speed of 25 mph when tire pressure is 50 lb. and the load 13,800 lb. When load is increased to 15,360 lb., pressure for this same tire should be raised to 60 lb. if the same maximum speed is to be maintained. Of course, with less speed more load can be carried at a constant air pressure.

Off-the-road tires are heavily constructed in order to withstand impact and to hold up under severe cutting. But they are not made for speeds over 25 mph as are passenger car tires. The heavy plies produce an enormous amount of heat at higher speeds because of the increased flexing of the sidewalls. Because of their thickness, heat cannot escape, so gradually builds up and causes separation of the plies and eventual blow-outs.

Overloading—Pay?

Blow-outs are also caused by overloading. In hot weather when speeds are too high for the heavy load, tire pressure will rise sharply. When the pressure has risen more than 15 lb. the danger point has been reached. But it is not wise to bleed the tires of the extra pressure. Instead the load should be lessened and the operating speed reduced. During hot weather when tires are bled a change in temperature will naturally bring down air pressure and cause under-inflation.

Excessive heat may also be caused by under-inflation. Again the sidewalls will flex too much and the cord body may break down, or the plies separate from the tread. Low pressure can cause the tire to chafe against the rim flange, and the edges of the tread will also scuff over the road. The center of the tread will buckle and rapid wear on the shoulders of the tire will result.

Rig operators who have the notion that hard tires hold a bigger load soon find out their mistake. Besides being harder riding and pounding equipment to pieces, over-inflated tires are more easily punctured by rocks. Also, over-inflated tires have less tread area and will sink into soft ground more easily.

Another practice to be avoided is spinning. Usually when traction wheels begin to slip, continued spinning will only cause the wheels to sink deeper. A few "spins" will wear several hours of rubber off, and possibly result in cuts to the sidewall.

Additional "Don'ts"

Steep grades are bad on a haulage road especially in wet weather. Chuck holes on haul roads where water can accumulate should be filled in. Besides the fact that wet ground provides the greatest "spinning" danger, rubber will cut three to four times easier when it is wet.

Additional "don'ts" include turning so sharply that the inside tire pivots instead of rolling. Pieces of sharp stone can be twisted into a pivoted tire like a screw is turned into wood. When a dozer is used behind a scraper, often the tendency is to bump the rear wheels with the dozer blade. Nicks in the scraper tires will pick up pieces of stone, which in turn gouge deeper into the tread, finally making a major trouble spot. Tires should frequently be cleaned of such material.

Blows to the wheels may also bend the tire rim flanges. Bent rims chafe tires and if not repaired, may be forced off the wheel with enough force to kill anyone unfortunate enough to be in the way. Tire boots should never be used except in emergencies and valve caps should be kept in place to prevent dirt or oil from wearing valve cores. A slight leak in one of a pair of dual tires will throw the load on the higher tire and cause undue wear.

A tire with a cut into the cord body should be removed from service and restored with a vulcanized repair. If only a small puncture, protection usually may be obtained by forcing repair cushion gum into the injury from the inside and outside and then applying a small patch on the inside over the puncture. Larger injuries in the cord body definitely require a vulcanized repair.

Because off-the-road service is tougher in some respects than normal trucking service, repairing has not always been as successful as that of highway truck tires. In the last few years, however, great advances have been made in repairing such tires. Today a good, experienced repairman can add many miles to the life of an off-the-road tire previously considered irreparable.

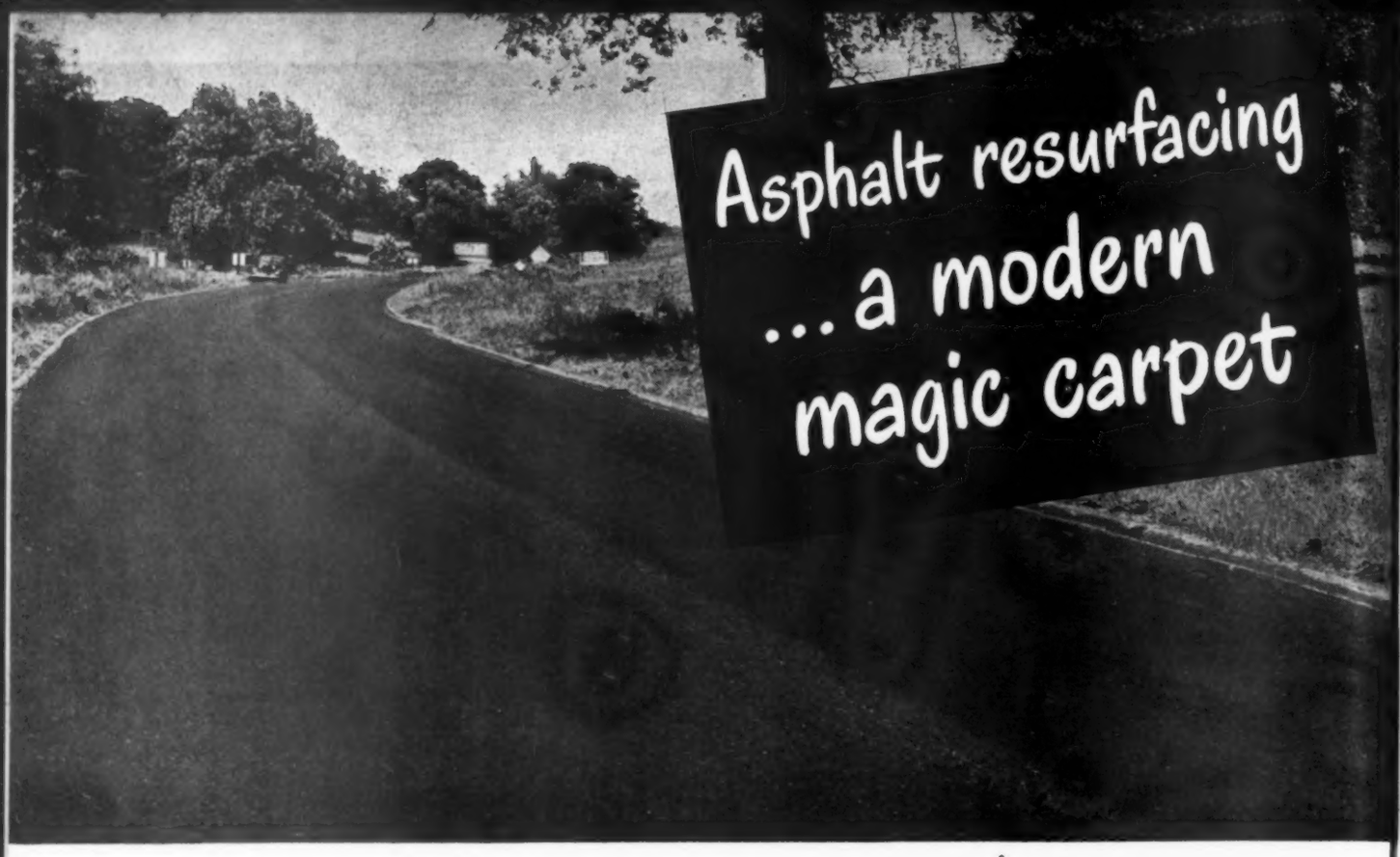
On Repacking Stuffing Boxes

From Johns-Manville's "101 Suggested Good Operating Practices"

WHEN the packing in a stuffing box has become worn, dry and compressed, it is time to make a replacement. In making the replacement, however, it is important that certain good practices be followed, otherwise the new packing will be little better than the old.

As in most mechanical maintenance, shop cleanliness is of prime importance. Grit and foreign matter picked up by the packing during the time it is on a dirty bench will score the rods, shafts, or sleeves. After the packing has been completed, all unused packing material should be wrapped and placed back in its container.

When all the old packing has been removed, the box walls cleaned, and the new packing cut to size, seat each packing ring carefully before placing the next one in the box. Loading a stuffing box with packing and pulling up on the gland follower, may cause excessive deformation of the first two rings, thus building up localized gland pressure. All joints should be staggered and kept approximately 90 degrees apart. Spot the



ASPHALT resurfacing has proved to be a modern magic carpet for both road-builders and road-travellers. It has helped highway departments and contractors reach new speeds in road-rebuilding. It has provided safe, smooth-riding travel for highway users.

One method of asphalt resurfacing is described below. Standard Oil Asphalt Department Representatives can suggest other types of asphalt construction to meet your needs and local conditions. Write Standard Oil Co. (Ind.), 910 S. Michigan Ave., Chicago 80, Ill.

Steps in one method of Asphalt resurfacing construction

Spot Patching—Where the old highway is badly broken, holes are patched by filling with an asphalt-aggregate mix delivered hot from a central mixing plant.

Prime Coat—This is a thin coat of cut-back asphalt spread over both the old road surface and the patches that have been brushed clean. When used, it helps to bind the asphalt to the old surface.

Binder Course—An asphalt-aggregate mix is delivered hot from the central mixing plant to an asphalt finishing machine and is laid from 2 to 3 inches deep over the old road surface and patches.

Wearing Course—This is the top course composed of asphalt, stone, and sand. It is mixed hot at the central mixing plant and laid by machine. This top course presents a smooth, waterproof, long-wearing surface which requires no seal coat or stone application.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

joints in clockwise direction to facilitate locating them when the packing is removed.

With the packing installed, pull up the gland follower to insure final seating. The nuts should be backed off two or three turns to relieve excessive pressure. Do not be afraid to let the packing leak a small amount because this is a good assurance that it is not too tight.

If the stuffing box is provided with a water, oil or grease lantern, make sure that the lantern is so located that it will be advanced to its proper location with respect to the opening in the box as the packing is taken up. Then check to see that the opening into the stuffing box has no obstructions to prevent the flow of sealing water or lubrication into the lantern.

Do not use a heavier sheet packing than is necessary. It is also advisable to use ring gaskets instead of full face gaskets where flanges are heavy enough to prevent distortion. In selecting gasketing dopes, use graphite, glycerine, or molasses compounds which will not injure rubber gaskets, rather than oil or grease compounded dopes. Never use dope on both sides of the gasket, since it may cause slippage or a blowout.

Before throwing away the packing removed from a box, it should be examined for clues as to the condition of the equipment. It may also be the means of solving packing problems. For instance, excessive reductions in the cross-section of the packing directly beneath the rod, shaft or plunger may be caused by low bearings; the shaft or rod riding on the packing. In service, early leakage occurs around the top of the shaft or rod.

Excessive reduction in the thickness of the packing directly over, or on either side of rod or shaft, may be caused by the rod or plunger being out of alignment. In the case of the rod or shaft, the bearings may be badly worn, thus causing whipping of the shaft.

If rings are missing from the set, the trouble may stem from the badly worn bottom of the stuffing box. Considerable difficulty, such as the packing getting into the valves, or traps, or contamination of the fluid handled, may result from this condition.

Wear on the outside diameter of the packing may be caused by the rings rotating with the shaft. A bulge in the side of one or more of the rings could be the result of the adjacent rings cutting too short, causing packing under pressure to be forced into the open space.

If the rings next to the gland followers are badly deformed and the bottom rings are in fair condition, then the packings were improperly installed and there was excessive gland pressure. When the wearing face of the rings is dried and charred, and the rest of the packing is in good condition, it indicates a lack of lubrication in conjunction with high temperatures.

•

Better Equipment Will Mean More Economical Road Building

(*Continued from page* 94)

and problems to the contractors; the engineers contributed technical advice valuable to both manufacturing and consumer groups.

Out of these cooperative and harmonious discussions have come equipment which is more efficient and more economical in operation because it is practically "custom made," to specifications supplied by the men who will use them. This new equipment will be seen for the first time at the Road Show of 1948. It is going to have a marked effect on the costs of highways yet to be constructed.

•

Postwar Highway Program Moving Steadily Forward

American postwar highways completed by or ready to build on July 31 1947, totaled 45,285 miles according to a statement from the American Road Builders' Association.

This program costing $1,685,750,997 refutes the criticism that our postwar construction program has bogged down or been neglected, it was noted.

Mr. Upham pointed out that five road building steps are shown in the report of the Public Roads Administration as of July 31, 1947—roads in the program stage, roads for which plans have been approved but not yet under contract, roads for which contracts have been awarded but on which construction has not started, roads under construction, and roads completed. The mileage reported by PRA covers only that under Federal-aid.

At the close of July (PRA sources) 7,266.2 miles had been completed and 13,175.9 miles were under construction. Contracts had been awarded for 3,181.5 miles, plans approved for 4,090.7 miles, 17,570 miles in preliminary stage. This shows that some 60% of the plans for the entire 3-year program have already been approved.

Roads of the Federal-aid system call for 14,584.1 miles, Federal-aid secondary roads 30,109.5 miles and Federal-aid urban projects 591.4 miles to make up the total of 45,285 miles. Of the total of more than $1½ billion, $850,515,681 will be paid out of federal funds.

Seventeen states have programs of more than 1,000 miles each with Texas leading with 5,735.5 miles, according to the PRA report. In the various groups, Texas leads in the federal-aid system with 1,397.5 miles. Minnesota is second with 948 miles. Texas also leads in the secondary roads group with 4,323 miles. Kansas is next with 2,783.8 miles. In federal-aid urban projects, California is first, with North Carolina in second place.

"A CREASE HE WANTS IN HIS OVERALLS NOW HE'S A FOREMAN ON THAT ROAD JOB."

New Construction Equipment and Materials

1
Tractor Loader

An improved Lion tractor loader has been announced by Lion Products Co., Omaha, Neb. The loader has been simplified and strengthened to give longer, trouble-free operation. Every part is claimed to feature a rugged, exacting construction that

Lion Tractor Loader

gives perfect operation. It's extra strong lifting arms and twin cylinder "Direct Lift" method of power application are stated to handle full loads easier without strain on tractor. Clear vision and fast lifting and dumping action make it possible to do work faster. It can be attached or detached in a few minutes time.

2
Welding Apparatus Carrying Case

The availability of an improved carrying case for transporting a welding or cutting outfit right to the job in an orderly and compact manner has been announced by Air Reduction Sales Co., New York, N. Y. Torch, tips, regulators, hose, gloves, goggles, wrenches and miscellaneous equipment can all be compactly arranged in this new case. The new Airco carrying case's construction is of 22 gauge cold rolled steel with flush double lock seams. The carrying case has a net weight of 10½ lb. Its dimensions are 22 in. long, 8 in. wide and 9 in. deep.

3
New Utility Jackhammer

A new rock drill designated as the J-10 Utility Jackhammer has been announced by Ingersoll-Rand Co., New York, N. Y. This new air operated drill has been designed and built for general utility and plant maintenance work. It will do many drilling jobs in construction and maintenace work. The J-10 is a true Jackhammer in every sense. It has strong automatic rotation and uses standard Jackbits. By using adapters, star drills can be used to drill

J-10 Utility Jackhammer

holes 1⅛ in. and under. Also by removing the rotation pawls or using round shanked tools it can be used as a light paving breaker or for chiseling and channelling. A built-in oil reservoir, in the handle, supplies ample lubrication.

Mail Inserted Card

For data on equipment described on these pages. See also inquiry blank on page 130.

4
New Portable Mix Plant

A new 2-yd. portable compact ready-mix concrete plant in one complete unit, accurate, dependable, easily moved, quickly erected has been announced by C. S. Johnson Co., Champaign, Ill., a Koehring subsidiary. It has all welded main sections and bin in two main sections. Two column end frames, floor beams and cross bracing, are prefitted. Complete unit can be easily moved up close to the job by rail or on flatbed trucks. Quick, easy, field bolting of sections speeds erection. It is sold complete in every detail, ready for installation of a 56-S mixer.

5
New Truck

A new four-wheel, heavy duty, off-highway truck, the Model KBR-14, has been announced by International Harvester Co., Chicago, Ill. The KBR-14 has a gross vehicle weight rating range of 32,000 to 41,600 lb., depending upon the type of service and severity of conditions under which it operates. It is available in three wheelbases, 161, 179, and 215 in. with cab-to-axle dimensions of 72, 90, and 126 in., respectively. The new truck is powered by the 6-cylinder International-Continental R-6586

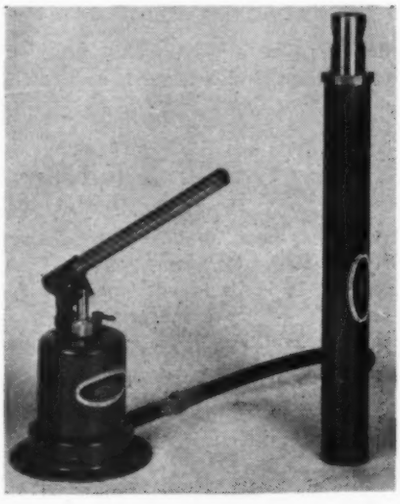
Model KBR-14, with 161-in. Wheelbase Chassis

valve-in-head engine. This engine has replaceable cylinder liners, full-length water jackets, mechanical vacuum-

type governor, and other outstanding features. Bore is 4 13/16 in.; stroke, 5⅝ in.; piston displacement, 586 cu. in. Maximum brake horsepower is 200 at 2600 r.p.m., with maximum torque of 475 pound-feet at 1000 r.p.m.

6
New Hydraulic Jack

A new pump and hydraulic ram has been announced by Miller Hydraulic Engineering and Sales, Detroit, Mich. The unit is single acting and manually operated. The pumping unit is small, sturdy and requires a minimum of space for installation



New Hydraulic Ram

and operation. The control valve has a positive action and permits lowering at any desired speed, regardless of position of operating handle. Three standard sizes of rams are available, having lifting capacities from 2210 to 8885 lb. (based on 5,000 P.S.I.). Hydraulic rams can, however, be furnished with any stroke, type of bottom, and "top of plunger" to meet all requirements.

7
New Service Parts Kits

A new and complete line of 31 service parts kits, designed for use in overhauls of Cummins diesel engines, has been introduced by Cummins Engine Co., Inc., Columbus, Ind. Each of the 31 kits in the new series contains all the genuine Cummins parts needed to overhaul a specific sub-assembly unit of the Cummins diesel engine. Contents of each kit in the new series was determined by the experience of mechanics in the field, coupled with extensive research at the Cummins factory.

Light, versatile, easily maneuverable, this W-W 10-15 ton lowbed is available in either semi or full models. Oversize axles, scientifically designed frame, heavy duty pressed steel wheels, extra heavy brakes and other features contribute to the dependability and low cost operation of this light lowbed.

4 sizes available. The 10-15 tonner is available in four standard sizes. Bed widths are 8′ or 8′6″ with optional loading deck lengths of 8′ or 10′. Overall length of the semi trailer is 19′6″ and 27′3″ for the full trailer.

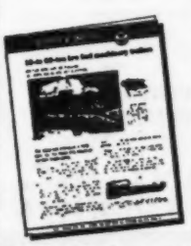
Strong unitized construction includes a gooseneck which is an integral part of the frame. Electrically welded into one solid unit, the scientifically engineered frame distributes the load over all frame members—reduces center point strain—assures a lowbed which can take reasonable overloads without weakening.

Dual purpose trailer. Full trailer can be converted to a semi by elimination of the front dolly assembly. Rugged 5th wheel plate with heat treated alloy steel king pin works equally well in semi or full trailer operation.

IMMEDIATE DELIVERY available on any standard 10-15; 20-35 or 40-60 ton models.

Coupon brings pictures, specifications on any type lowbed desired. Simply attach to your letter head and mail today.

The WINTER-WEISS Co.
2201 BLAKE STREET DENVER 2, COLORADO



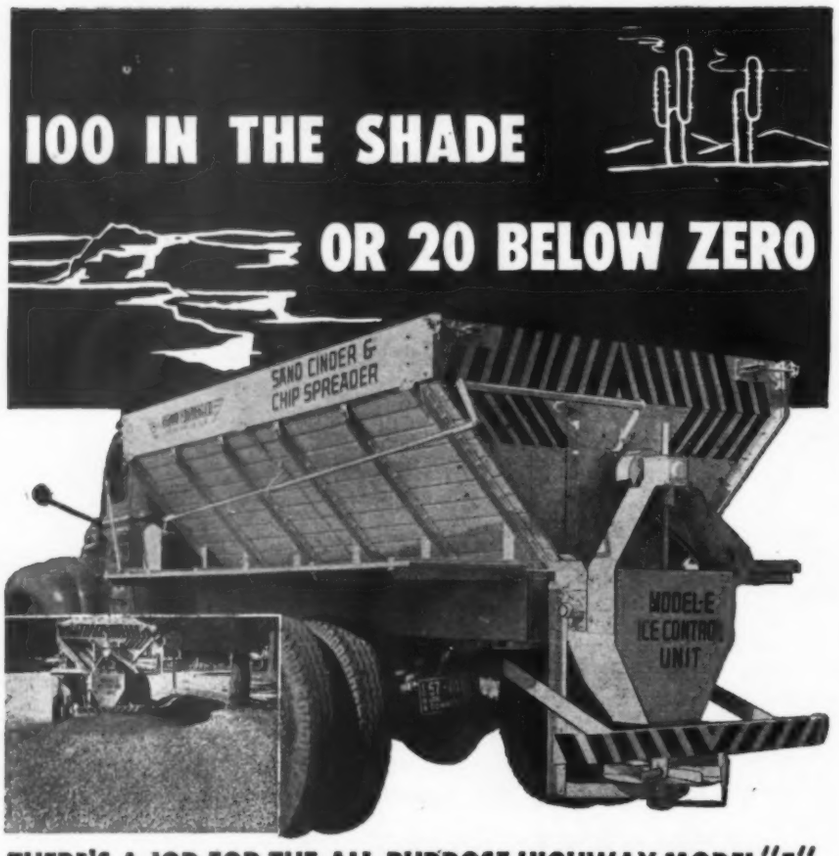
Gentlemen: Please send illustrated catalog on W-W lowbeds. We are particularly interested in a _____ ton model with loading deck length of_____feet between gooseneck and rear tires.

Firm Name_____

Address_____

City_____ Zone____ State_____

By_____ Title_____



THERE'S A JOB FOR THE ALL-PURPOSE HIGHWAY MODEL "E"

● Spreading sand and cinders for ice control on streets, highways airport runways, etc. ● Spreading calcium chloride for dust control on secondary roads, parking lots, airports, fair grounds, etc. ● For seal coat work, spreading chips, sand, etc., over newly laid oil or blacktop ● Patch work spreading ● Spreading commercial fertilizers in parks, on lawns ● Hauling crushed rock and chips ● General road and shoulder maintenance

14 OUTSTANDING FEATURES THAT SAVE TIME, MATERIAL AND MONEY

1. Uniform spread at all speeds.
2. Covers 2 or 4 lane highway in one operation.
3. Spreads material on highway where needed. No material wasted on shoulders.
4. Operates forward or reverse.
5. Spreads to right, to left, or both sides as desired.
6. Material is cast low to ground—no interference with traffic.
7. Spread may be started or stopped with truck in motion.
8. All controls within easy reach of driver's seat—one-man operation.
9. Material is also spread ahead of rear wheels of truck assuring traction and safety at all operating speeds.
10. Electrically welded all steel frame.
11. Wooden hopper eliminates corrosion from chlorides, assures longer life; also wet material won't freeze to sides in cold weather as is often the case with a steel hopper.
12. Ball bearing gear boxes, oil tight, dust and water proof.
13. Self-unloading 24" wide conveyor assures steady material flow.
14. Hopper sides hinged for easier hand loading.

The Highway Model "E" Spreader is made in 9, 11, 13 and 15 ft. lengths—easily mounted on any standard truck chassis. Other lengths made on special order. Write for literature—today.

●

SOLD AND DISTRIBUTED BY
LEADING CONSTRUCTION MACHINERY DEALERS THROUGHOUT
THE UNITED STATES, CANADA, AND FOREIGN COUNTRIES

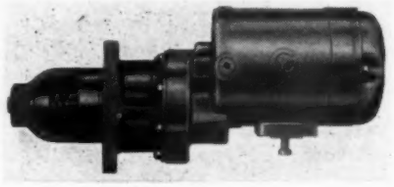
HIGHWAY EQUIPMENT COMPANY, INC.
605 D AVENUE N. W. • CEDAR RAPIDS, IOWA

MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF SPREADERS

8

New Diesel Engine Starter

A new air starter for diesel engine equipment has been brought out by Chicago Pneumatic Tool Co., New York, N. Y. The starter is a 7 H.P. air motor with a Bendix starting drive. A unit 18 in. long and 5½ in. in diameter, it is mounted on any diesel by means of an SAE No. 2



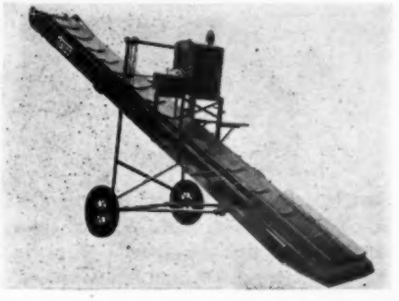
CP Air Starter

flange. The air starter is stated to easily handle diesels up to 600 cu. in. displacement.

9

New Trough Conveyor

An improved portable trough conveyor has been announced by George Haiss Mfg. Co., Inc., New York, N. Y. It is designed especially for handling of loose materials such as sand, gravel, stone, etc., from hopper



Haiss Improved Portable Trough Conveyor

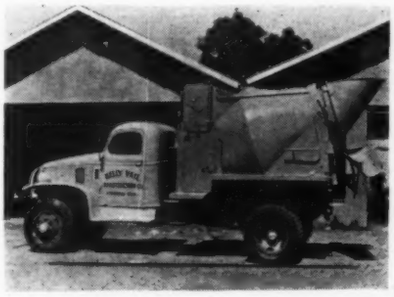
bottom cars to trucks or storage piles or from storage piles to trucks, bins, etc. It also is suited for handling concrete from mixers to forms. It is built in standard belt widths of 16 in., 20 in., and 24 in., and standard lengths from 20 ft. to 60 ft. in multiples of 5 ft. Fitted with electric motor or gasoline engine. Mounted on steel or rubber tired wheels. Capacity is from 60 to 180 tons per hour.

10

New Truck Mixer

Blaw-Knox Co., Pittsburgh, Pa., has started regular production on its "Hi-Boy Trukmixer," its first truck mixer of high-discharge type and its first new design since before the war. The company will also continue manufacture of its horizontal model, which

is known as the "Lo-Boy." Unique feature of the new high-discharge machine is a revolving hopper for both charging and discharge. This permits a gadget-free and streamlined rear end, with advantages in operation and savings in maintenance. The hopper is supported directly from the end of the mixing drum cone and moves with the drum as the truck frame weaves [illegible] operating conditions. The hopper remains in alignment [illegible] drum and avoids the eccentric grinding action which results when the mixing drum rotates and its axis does not coincide



Blaw-Knox Hi-Boy Truck Mixer

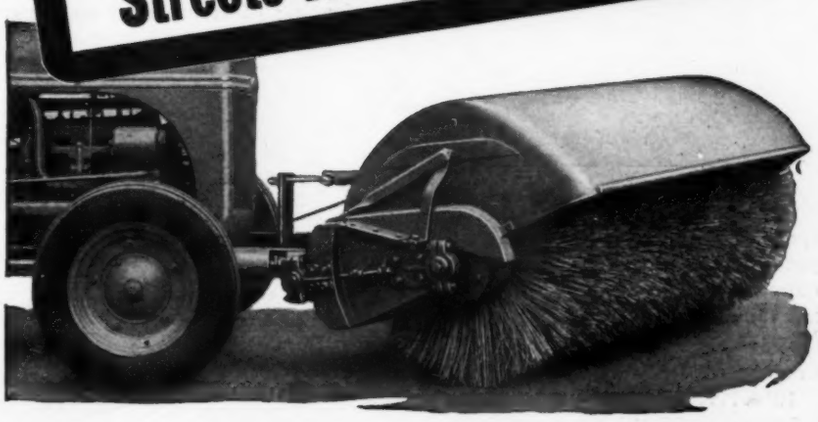
with the axis of the stationary hopper. While charging, the hopper is held in upright position by a simple latch which prevents the hopper from rotating with the mixing drum. When the operator wishes to discharge, he opens the latch which permits the hopper to rotate 180 degrees with the drum, where it is again held with the latch while the mixed concrete is discharged through the same hopper in an inverted position. The hopper latches automatically in each position. It provides a 32-in. unrestricted opening into the drum for fast charging. The Blaw-Knox Hi-Boy is made in standard sizes of 2, 3 and 4½ cu. yd.; the corresponding respective capacities when used as agitators are 3, 4¼ and 6⅛ cu. yd. The company's truck mixers and agitators comply with the standards of the Truck Mixers Manufacturers Bureau approved by the National Ready-Mixed Concrete Association.

11

New Crushing and Screening Plant

A new crushing and screening plant, announced by Pioneer Engineering Works, Minneapolis, Minn., is a semi-portable outfit producing two sizes of aggregate and sand. This No. 55 is a compact hopper-fed plant, consisting of a jaw crusher, bucket elevator, and transfer conveyor—all mounted on a 4-wheel trailer. The revolving screen is a complete unit

For Better Asphalt Paving . . .
For Removing Snow and Debris from
Streets-Alleys-Sidewalks



LITTLE GIANT POWER SWEEPER

Widely used for cleaning the street furnace before applying the seal coat in asphalt paving. Assures more permanent paving—helps eliminate bubbles or blisters. Also used for city clean-up work and snow removal.

For All Tractors, Jeeps
Little Giant Sweeper mounts on all tractors and Jeeps, normally requiring less than 90 minutes to attach. Operates from power take-off. Brush sets at 30 degree angle. Sweeps to right side of tractor, outside of wheel path. Sweeps against forward motion of tractor for increased efficiency. Dependable chain drive—all moving parts are scheduled for operator's protection.

Long-Wearing Brush—Dust Hood
Brush lengths of 5, 6, 7, 8 and 9 feet can be furnished. The 5-foot length is recommended for sidewalk snow sweeping. Long-wearing Palmyra brush fibre, refillable at nominal cost. Adjustable ground pressure—brush can be quickly set to fit all sweeping conditions.
Dust hood helps keep tractor clean—assures clear vision for operator. Hood can be removed in 15 minutes for sweeping snow.

Little Giant gets the sweeping job done faster. It quickly pays for itself in labor saved. The initial investment is low—very little upkeep expense. Can be used year-round—for snow in the winter and rubbish the rest of the year. Designed by experts with years of experience in the sweeping field. Widely used by municipalities, airports, road contractors and industrial concerns.

We are in production and can make prompt delivery. Let us send you complete information and prices. Write

LITTLE GIANT
PRODUCTS, INC.
1581 N. ADAMS ST.
PEORIA 3, ILLINOIS

easily mounted on either steel or wood bin. Weight of plant with 1016 jaw crusher and bin—approximately 26,000 lb. 20 cu. yd. three compartment bin included with plant when

No. 55 Crushing and Screening Plant

specified. Capacity of the plant depends upon size of aggregate required and size of jaw crusher which is available in two standard sizes.

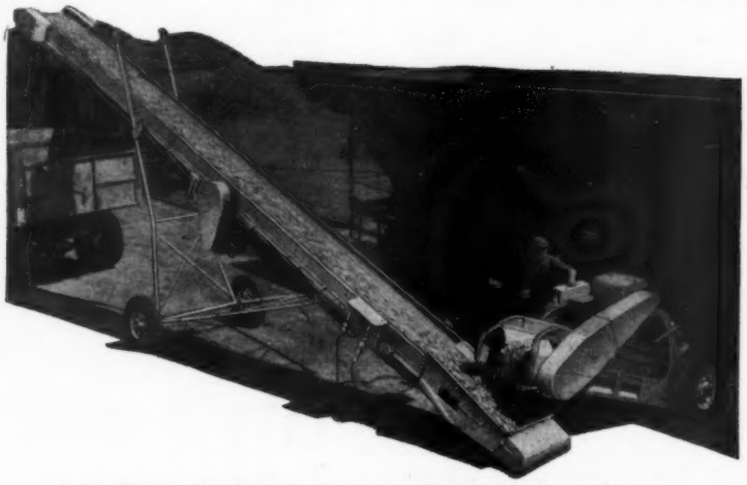
Size Crusher	Capacity 1½-in. Setting
1016	10—15 tons per hour
1024	15—25 tons per hour

A 50 continuous horsepower gasoline or diesel power unit is mounted between crusher and bucket elevator. Plant includes multiple V-belt drive from power unit to jaw crusher, drive from crusher to elevator and revolving screen, necessary hoppers and spouts for operation of complete plant. In transit, bucket elevator folds back over truck, reducing travel height to 11′ 6″. A winch and crank raise and lower the elevator.

12

New Car Unloading "Team"

Two new units for facilitating the unloading of stone, sand and gravel from hopper cars have been announced by Barber-Greene Co., Aurora, Ill. These units are a new type heavy-duty car unloader called the "358," which has a capacity range of up to three tons per minute operating in pits or above rails: and for working with the 358 is the new 636 stockpiler-loader which features many new developments in postwar design. Unique among the many features of the 358 unloader is its chain and belt conveyor. Chain and belt are riveted together by



Barber-Greene 363 Stockpiler-Loader and 358 Hopper-Car Unloader

GET READY WITH A

GLEDHILL SNOW PLOW!

Insert shows standard plow with under-truck mounting. No holes to bore—hook bolts clamp over main truck frame. Crimped moldboard keeps snow light, aerated and fast flowing. *Send for detailed bulletin!*

AVAILABLE THROUGH DISTRIBUTORS ACROSS THE NATION

GLEDHILL ROAD MACHINERY CO., Galion, Ohio

means of steel attachments and cleats: power is transmitted through chain and belt. Drive is through a sturdy V-belt, through a precision-built, oil-tight speed reducer. There is a roller chain takeoff for final drive to the head shaft. The 363 stockpiler-loader is completely new in design. Its stair-channel frame is strong and rigid; simple swiveling wheels make it flexible for all types of unloading and stockpiling service. Available with plain or cleated belts, the 363 eliminates trouble due to old-fashioned chain and sprocket drive through its use of V-belt drive, two precision gear reducers and a shaft drive to the head pulley. Three-unit belt carriers mounted on welded steel bases trough the belt and minimize belt wear. Antifriction bearings are used throughout. The tail pulley cover plate on the 363 is removable, as also are the hopper plates which further emphasize its usefulness under a variety of operating conditions.

13

New Hole Digger

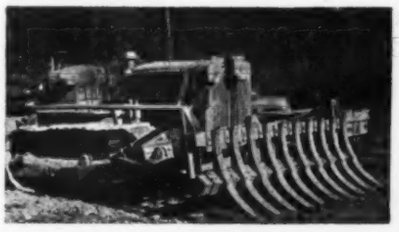
A new hole digger developed by Roper Manufacturing Co., Zanesville, O., is claimed to hold a true course at any angle. Geared for high speed operation, the equipment is stated to be able to dig holes up to 24 in. in diameter and 32 in. deep at the rate of two per minute. The digger has a three-point suspension system of locking bolts and pins, thus providing a rigid tractor mounting. The digger has been developed for use on Ford tractors, Allis Chalmers models B and C, Universal Jeeps and Ferguson tractors.

New Roper Hole Digger

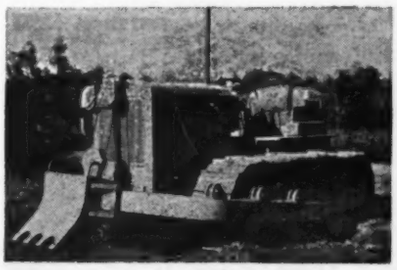
14

Root Rake and Stumper

Two new tools for land clearing operations have been announced by Florida Land Clearing Equipment Co., Jacksonville, Fla. The Fleco root rake is stated to dispose of top growth and roots in a single operation and to dispose of cuttings without excessive piling of soil. The rake is manufactured in sizes to match the "Caterpillar" Diesel D6, D7 and D8 track-type tractors. The Fleco detachable stumper is an alloy steel casting designed for attachment to the frame of angling blade bulldozers. Simple of design, the stumper can be mounted or dismounted in a matter of a few seconds, permitting alternating use of a standard blade and the



Fleco Root Rake Attached to Caterpillar D7 Tractor



Fleco Stumper Attached to Caterpillar D7 Tractor

USED THE WORLD OVER

COMPLETE IS THE WORD FOR THE PERFECTION BODY AND HOIST LINE

Write for name of nearest Perfection Distributor

THE PERFECTION STEEL BODY COMPANY

Galion, Ohio

PERFECTION STAKE and DUMP BODIES HYDRAULIC HOISTS

FOR ANY TRUCK STANDARD or SPECIAL UNITS IN ALL SIZES · FOR ANY USE

stumper. The leading edge of the four teeth of the stumper are hard-surfaced. The stumper provides a cut 24 in. deep and 36 in. wide. Teeth of the stumper are made sufficiently strong to lift stump, tree or boulder as it pushes it from the ground. The rake and stumper will be marketed exclusively through the facilities of the Caterpillar Tractor Co.

MANUFACTURERS' LITERATURE

15

Reflective Glass Beads

Interesting applications of reflective glass beads are described in a folder issued by Flex-O-Lite Mfg. Co., Inc., St. Louis, Mo. Emphasized are the many ways in which reflective glass beads serve the cause of safety in taming hazardous curves on highways and streets, clearly defining traffic lanes and safety zones. A sample of Flex-O-Lite beads and a specially prepared beaded panel are affixed to the new literature.

16

Air Compressors

The new Air Chief line of industrial air compressors is described in a leaflet issued by Davey Compressor Co., Kent, O. The new literature contains mechanical data and specifications on complete Davey departmental units of 60-105-160-210 and 315 c.f.m. capacities. It also lists bare compressors suitable for installation with customers' motors or as replacement machines.

17

Highway Statistics

A new bulletin, "Highway Statistics, Summary to 1945" has been issued by Public Roads Administration. It presents in convenient form, historical information of general interest on the subjects of motor fuel, motor vehicles, highway-user taxation, highway finance, and mileage. Most of the statistics are carried back over periods of from 20 to 50 years, as available data permitted. A brief explanatory text is included. This new bulletin provides background for the annual series begun with the issuance by Public Roads Administration of the bulletin "Highway Statistics, 1945." Both bulletins are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., and may be obtained direct from that source. "Highway Statistics, Summary to 1945" is priced at 40c. a copy, and "Highway Statistics," 1945 at 35c a copy.

18

Tractor Sweeper

The Little Giant tractor sweeper, claimed to sweep faster and cleaner at less cost, is illustrated and described in a circular issued by Little Giant Products, Inc., Peoria, Ill. Thirteen outstanding features of the unit are listed and specifications are given.

19

Highway Ice Prevention

Prevention of ice formation on highways and streets with Cayuga rock salt is discussed in a bulletin issued by Cayuga Rock Salt Co., Inc., Myers, N. Y. Methods of application of rock salt are described and a comparison of the results obtained by treatments with abrasives and with rock salt is given.

"It's a REAL MONEYMAKER"
When put to work on—
cellars and sewers, pipe lines and water lines, irrigation and drainage ditches.
HANSON
Where the going is tough and the time is short, the stamina, speed and versatility of this HANSON will appeal to you. Made in two sizes, ⅜ yd. and ½ yd. Easily convertible to crane, (4½ and 6½ ton), shovel, clamshell or drag-line.
Some of the features which make this HANSON a moneymaker: Full revolving . . . chain crowd . . . fully enclosed steel cab . . . air-controlled steering . . . all-welded, steel construction . . . disc type clutches on swing . . . internal expansion, booster-type clutches on hoist and crowd . . . all clutches easily adjusted or relined without removing shaft assemblies . . . extra long crawlers and low center of gravity . . . speedy—versatile—rugged!
HANSON CLUTCH AND MACHINERY COMPANY TIFFIN, OHIO U.S.A.

20

Snow Plow

A snow plow that discharges to left or right at the operator's choice is illustrated and described in a bulletin issued by Root Spring Scraper Co., Kalamazoo, Mich. The removal of a single pin permits swinging the plow to operate at angles of 28, 35 and 42 degrees to left or right. Blades themselves are reversible for double-duty service life.

21

Welding

An 8-page technical bulletin, describing specific procedures involved in industrial equipment salvage welding with various gas and arc rods for producing hard overlay at low temperature, has just been issued by Eutectic Welding Alloys Corporation, 40 Worth St., New York 13, N. Y. Several interesting new alloys for the hard overlay process are featured.

22

Planning Concrete Plants

A 32-page booklet on planning concrete plants has been released by C. S. Johnson Co., Champaign, Ill., a Koehring subsidiary. Stated to be the first publication of its kind in this field, the book contains 60 photographs, 30 illustrations and presents pertinent information on the laying out of stationary and mobile plants. Operating techniques are thoroughly explained and detailed information is given on overhead bins, weigh batching equipment, cement and aggregate handling and storage. A definite procedure is outlined for starting either central mix, ready mix or concrete products plants. Blueprint type sketches explain in detail the types and disposition of equipment involved in different installations. Sequence of operation for most efficient output are given for each type of plant. In addition all auxiliary Johnson equipment is illustrated and described with all latest improvements.

23

Clamshell Buckets

A new 8-page booklet issued by C. S. Johnson Co., Champaign, Ill., a Koehring subsidiary, contains 29 photographs with illustrations, plus complete up-to-date analysis showing the advantages of modern all-welded clamshell buckets. Complete specifications are shown for all three types of Johnson all-welded clamshell buckets—general purpose, wide-rehandling and heavy-duty digging—ranging in size from ⅜ to 2½ yd. Booklet shows how Johnson's engineers have utilized all-welded construction to increase bucket strength . . . improve digging balance . . . and step-up bucket pay loads.

24

Flame Thrower

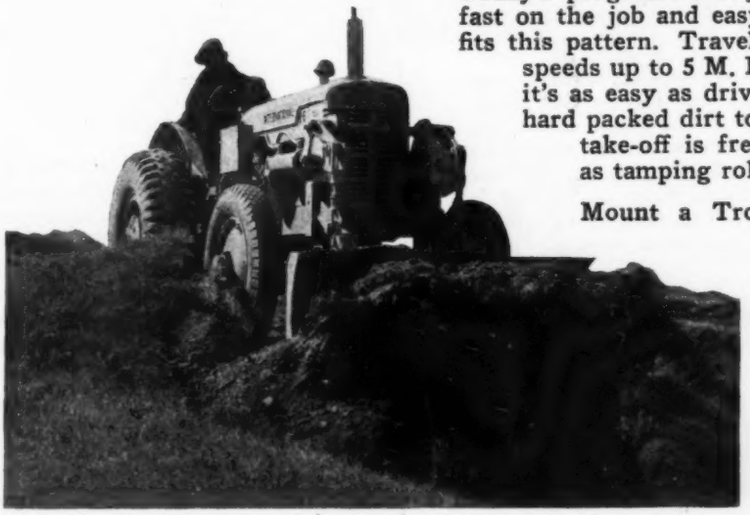
The Cedarburg portable flame thrower, illustrated and described in a circular of Cedarburg Manufacturing Co., Inc., Minneapolis, Minn., is a self-contained unit that will operate for 2½ hours on 1 gal. of fuel and produces heat off 2000° F. It is used for cleaning up weeds in culverts and along highway fence posts and for various thawing operations.

25

Rubber Tired Equipment

High speed, off-road hauling is discussed in a recent publication, "Going Places on Rubber," of the Caterpillar Tractor Co., Peoria, Ill. Rubber tired equipment is described

TROJAN *ANGLEDOZER*



Today's progressive buyers are looking for equipment that's fast on the job and easy to operate. The Trojan Angledozer fits this pattern. Travel speeds up to 15 M. P. H. Working speeds up to 5 M. P. H. One lever controls the blade and it's as easy as driving a car. Handles any material from hard packed dirt to light snow. The draw bar and power take-off is free for attaching other equipment such as tamping rollers, mixers, etc.

Mount a Trojan Angledozer on your Industrial Wheels and make them do double duty. Four models provide a wide selection. Easy to mount, simple to operate. Tested to give trouble free service.

Investigate today. Write direct or see your International Industrial Distributor.

Contractors Machinery Co. Inc.
Dept. RS-73 Batavia, N. Y.

operating on a range of jobs where high speeds are required on long hauls. Such operations as dam, road, airport and right-of-way construction, mine and quarry jobs, where it is necessary to carry large loads long distances, are pictorially and editorially described in the booklet.

26

Oil Filter Applications

A new catalog on oil filter applications for diesel engines has been issued by Purolator Products, Inc., Newark, N. J. It contains scaled diagrams of the many types of oil filters made by Purolator for diesel engine applications. The description page for each filter also includes a detailed specification chart giving all necessary technical information on construction, dimensions, capacity, weight, etc. There is also a reproduction of the A.S.T.M. standard viscosity-temperature chart for liquid petroleum products.

27

Air Drill Hose

A new descriptive folder on its Monarch and Ajax brands of air drill hose designed for heavy-duty service in mines and quarries where resistance to hot oils and abrasion is especially important, has been released by Hewitt Rubber Division, Hewitt-Robins, Inc., Buffalo, N. Y. The new folder tells of the many uses for the two brands of hose and describes their construction.

28

Portable Gravel Plant

A bulletin on its Twin Dual Master gravel plant has been issued by Universal Engineering Corporation, Cedar Rapids, Ia. This is a complete 3-stage crushing, screening and loading plant in one single unit. The various parts of the plant are illustrated and described and specifications are given.

29

Bulldozer Operations

The versatility of cable controlled bulldozers is graphically illustrated in "Dozing the Way," a 16-page booklet published by Caterpillar Tractor Co., Peoria, Ill. The booklet contains illustrations showing the various types and sizes of tractors and bulldozer blades used on many varied jobs from Coast to Coast.

30

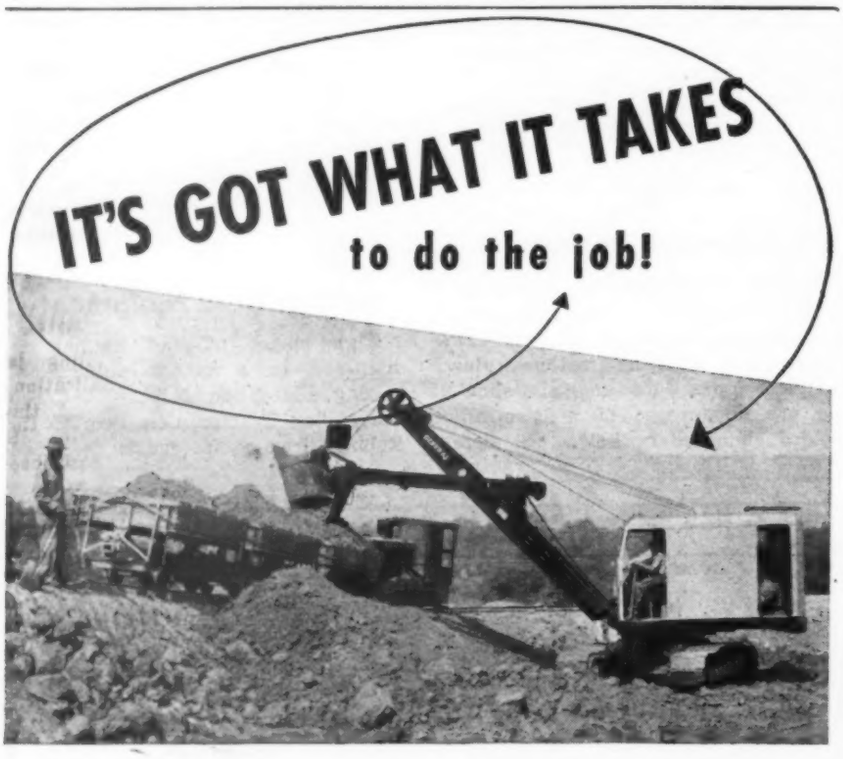
Wood Preservative

A new booklet, issued by Chapman Chemical Co., Chicago, Ill., tells the story of how modern chemistry is making wood last longer. The booklet discusses the chemical nature of pentachlorphenol, active ingredient in Chapman's "Penta" Preservative, and explains why this product offers many unique wood preserving advantages.

31

Scrapers

Two new pamphlets illustrating and describing LaPlant-Choate's hydraulic and cable-operated scrapers are now available from LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Ia. The hydraulic scraper pamphlet shows many action pictures of the company's four-yard scraper at work on a variety of jobs and describes the type of work to which the scrapers are best adapted. The cable-operated scraper booklet not only describes and illustrates job applications of these scrapers, now available in 6, 8 and 14 yd. capacities,



The GENERAL Biting into the mucky clay, getting a full dipper load . . . swinging around and up, reaching 'way out . . . dumping the load exactly where it's wanted! In less time than it takes to tell it, the GENERAL power shovel has completed the operation and is swinging back for more.

Over and over again, under the most difficult conditions, finishing the work in a hurry . . . that's the way a GENERAL power shovel is built to operate. The record tells why you can depend on a GENERAL to come through, time and again, with efficient, low-cost operation. That means time, money and manpower saved on your job when you've got a GENERAL. Plan now for the time when you, too, can enjoy the advantages that only a GENERAL can provide. The new GENERALS, tested and proved in service, will be ready soon . . . information is available now.

THE RECORD: 98% OF ALL THE GENERALS EVER BUILT ARE STILL IN ACTIVE SERVICE!

POWER SHOVELS • CRANES • DRAGLINES • CLAMSHELLS • BACKHOES • PILE DRIVERS

THE OSGOOD CO. O-G THE GENERAL CO. EXCAVATOR

MARION OHIO

DIESEL, GASOLINE OR ELECTRIC POWERED • ⅜ TO 2½ CU. YD. • CRAWLERS & MOBILCRANES

but also gives production and cost figures and points out how maximum production can be obtained. The pamphlet is also a practical textbook on scraper design and shows how design affects production. Both pamphlets contain detailed specifications of LaPlant-Choate scrapers.

32

Wellpoint Systems

A new catalog is ready for distribution by Griffin Wellpoint Corp., New York, N. Y. It contains latest information and photographs of Griffin wellpoint systems for dewatering, emergency and permanent water supply systems. Included, are six pages of data on jetting pumps with on-the-job illustrations.

33

Scrapers, Bulldozers

New specification sheets of its lines of landleveling scrapers, bulldozers, roadbuilders and hydraulic P.V.T. assemblies have been published by American Tractor Equipment Corporation, Oakland, Calif. The sheets contain photographs of the equipment and detailed information on construction and operating features.

34

Two-Wheel Scrapers

A bulletin on its new two-wheel scrapers has been issued by American Tractor Equipment Corporation, Oakland, Calif. Designed for high-speed use with wheel tractors, the open-top scrapers feature a low center of gravity, independent front apron, and a rear apron that cleans the scraper bowl sides as the load is dumped.

35

Utilizing Small Tractors

Methods of utilizing small size diesel track-type tractors and diesel engines and electric sets to obtain maximum efficiency on jobs which do not require larger models are descriptively outlined in a booklet published by Caterpillar Tractor Co., Peoria, Ill. The 16-page color booklet shows "Caterpillar" diesel D2, D4 and D6 track-type tractors combining their capabilities with straight and angling bulldozers, scrapers, loaders, scarifiers, discs and harrows, tampers and chisels for various types of construction work. It also emphasizes how spectacular results on small operations are recorded when balance between job needs and equipment used is properly applied and when supplementary equipment such as power shovels, draglines, crushing plants and light plants is driven by the proper sized diesel engines and electric sets.

36

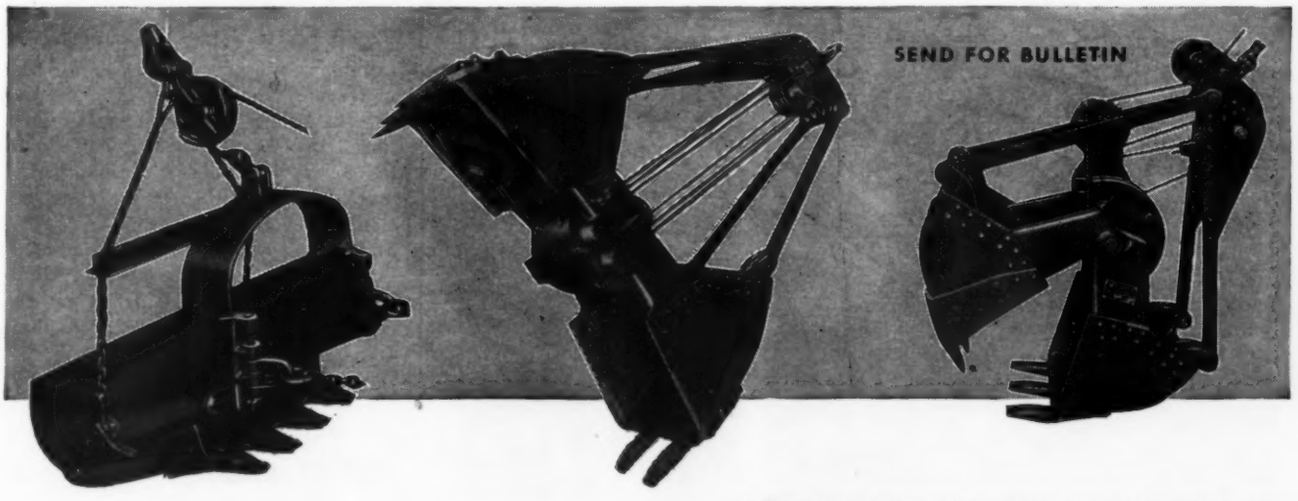
Diesel Engines

Distribution of the second 1947 issue of "The Dependable Diesel", a magazine for power users published by the Cummins Engine Co., Inc., is now being made. The magazine contains nearly 50 photographs of typical applications of Cummins Diesel Engines. It includes stories about the diesel in construction and such users of diesel power as Ayrshire Collieries Corporation, Big West Drilling Co., Pacific Intermountain Express, The Silver-Skagit Logging Co., Ltd., and others.

37

Steam Cleaning Machine

The new model No. 46B White vapor steam cleaner is described in a folder issued by White Engineering & Mfg. Co., Inc., 166 W. Passaic St., Rochelle Park, N. J. The folder de-



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WELLMAN

Williams Type **BUCKETS**

• Count on longer life and more efficient service ... due to Wellman original **welded rolled steel construction.** You get the maximum digging power, and exceptional strength—without excessive weight! Specify Wellman, and you'll specify the best bucket for your purpose.

THE WELLMAN ENGINEERING COMPANY
7003 CENTRAL AVENUE CLEVELAND 4, OHIO

• Large capacity, compact design, and lightweight aluminum construction are combined in this new, rugged, portable electric plant. Easily carried by two men. Powered by Onan 10 HP horizontally-opposed, two-cylinder, 4-cycle, air-cooled engine. Unusual operating economy. Shipped complete, equipped with four-receptacle outlet box and mounted in tubular-steel guard frame.

NEW ONAN CK ELECTRIC PLANTS are available in 5,000 Watts D.C., 115 and 230 volts; 2000 and 3000 Watts A.C. in all standard voltages.

ONAN ELECTRIC PLANTS—*A.C.: 350 to 35,000 Watts in all standard voltages and frequencies. D.C.: 600 to 15,000 Watts, 115 and 230 Volts. Battery Chargers: 500 to 6,000 Watts, 6, 12, 32 and 115 Volts.*

ONAN AIR-COOLED ENGINES—*CK: 2-cylinder opposed, 10 HP. BH: 2-cylinder opposed, 5.5 HP. JB: 1-cylinder, 3.25 HP.*

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ONAN ELECTRIC PLANTS

FASTER LOADING, LIFTING, SCRAPING

"The Ottawa" Industrial Hydraulic Front End Loader saves hundreds of man hours on every job. A rugged heavy duty attachment for industrial type tractors that loads bulk materials, does light bulldozing jobs and operates as a portable crane. A year 'round labor saver—will do hundreds of odd jobs better faster. Handles loads up to 4,000 pounds, lifts to a height of 9½ feet. It is shipped complete with super-powered Hydraulic system. Bulldozer, Boom and Snow Plow attachment available to give you maximum productive use of your industrial tractor. Hundreds now in use by contractors, quarries, building material and coal dealers and municipalities.

Write today for prices and illustrated bulletin. Immediate shipment. Fits most models industrial tractors.

Ottawa STEEL PRODUCTS, Inc.
INDUSTRIAL DIVISION
OTTAWA, KANSAS • U. S. A.

scribes the features and operation of the cleaner, which is intended for cleaning of road and construction machinery, trucks, buses, automobiles, railroad, marine and general industrial equipment. Included in the folder is a diagram showing all the parts of the cleaner, drawing attention to the minimum number of operating valves which the manufacturer claims as one of its 16 listed features.

38

Fire Resistant Canvas

A booklet on Fire Chief fire-resistant canvas has been issued by Wm. E. Hooper & Sons Co., Philadelphia, Pa. It describes the many characteristics of the treated canvas, including resistance to fire, water, wear, weather and mildew. It also shows typical applications of the product in different climates, in many industries where canvas is used. An especially interesting section tells about the many field and laboratory tests which the canvas undergoes in a continuous research and development program.

39

Plant-Mixed Asphalt Pavement

Detailed descriptions of types of asphalt paving in which asphalt and aggregate are mixed in a plant are set forth in a booklet recently published by The Texas Co. This booklet covers the proper procedure and materials to be used in the construction of sheet asphalt, sand asphalt—and the various types of hot and cold-laid asphaltic concrete paving. Helpful information is furnished on the correct method of unloading asphalt from tank cars.

(*Continued from page* 73)

APWA Maps Membership Expansion

years to private interests which sign up for 25 years.

Expressway vs. Traffic

The planning and location of urban expressways received brief discussion. What to do while waiting for these costly ultimate improvements was one point. Suggestions made: (1) that cities provide controlled access more systematically on existing main arterial streets. (2) that even momentary parking be rigidly controlled during rush hours, when

SYNTRON

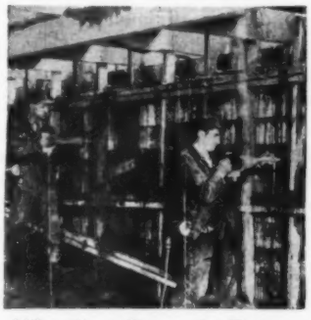
DEPENDABLE

ELECTRIC HAMMERS

Will Save You Money on Jobs Like These—

Bush Hammering Concrete Surfaces

Cutting and Chipping



Vibrating Concrete Forms

3600 powerful blows per minute from one working part—THE PISTON

Write for catalog literature

SYNTRON CO.

384 Lexington St., Homer City, Pa.

bottlenecks form quickly. (3) that cities provide and encourage building of off-street loading and unloading facilities for trucks in commercial areas when feasible; (4) systematically eliminate left turns; (5) improve signalization of present arteries.

It was noted that intersections at grade are definite limiting factors in traffic flow, their ceiling being about 300 to 400 vehicles per hour of green light per lane. An Atlanta official added that two or three intersections per mile of arterial street will reduce peak capacity to ⅖ or even ⅓ that of uniform flow. When expressways are planned through a city, all types of traffic and parking facilities ought to be restudied and replanned in conjunction, aided by origin-destination surveys.

Traffic Drew Big Group

In summarizing the sessions of the association's Committee on Street and Highway Traffic, Grant Mickle, chairman, said that the committee would undertake to review and make a condensed summary of the notable but lengthy report on traffic administration, recently issued by the Joint Committee of AASHO, APWA and the Institute of Traffic Engineers. [This report will be published soon by the Public Administration Service. 1313 E. 60th St., Chicago. Price $2.50—Ed.].

•

(*Continued from page* 93)

Atomic Structure and Mechanism

there should be no alternative explanation of the "excess motion" of Mercury's perihelion, nor of the deflection of star light passing near the sun. But streams of spiralling solar electrons induce magnetism in Earth and in Mercury; hence they are magnetically attracted in the direction whence the electrons come, and this must add to the advance of Mercury's perihelion.

The Earth is encased in numerous ionospheres, several lying beyond the moon, as made evident by their reflection of radio signals. The sun's incandescent photosphere and the corona of twice the diameter of the photosphere are ionospheres loaded with gases. Many others doubtless exist, all of which must refract light. The direction of refraction depends on which side of the middle of the ionosphere-shell a ray passes. Such facts were unknown when Einstein's "special" and "general" theories were

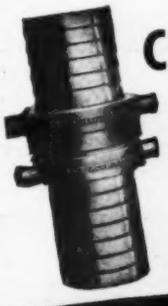
ASK FIRST FOR

Series 650 Type BC—Brass Combination Male Hose Nipple, the ideal nipple connection for petroleum products, for salt water and certain corrosive liquids. Sizes 1" to 6" I.P.T.

LE-HI

Series 150-B—The only Universal Type Hose Couplings with the patented "Safety-Locking" feature that positively prevents accidental uncoupling. Rugged, lightweight bronze alloy. REAL SAFETY for operators. Interchanges and locks with other standard couplings. Hose sizes ½", ¾" and 1".

BRASS HOSE COUPLINGS



Series 800—Brass Suction or Water Discharge Hose Coupling—Pin Lug Type. For hose sizes from 1¼" to 6" I.P.T. Also made in Garden or Heavy Duty Water Hose sizes ½" to 1" with hexagon or octagon swivel nut.

LE-HI MAKES A GOOD CONNECTION!

Ask your local distributor for these tough, dependable LE-HI Hose Couplings — NEVER SOLD DIRECT.

LE-HI HIGH and LOW PRESSURE HOSE COUPLINGS

HOSE ACCESSORIES CO.

2762 North 17th Street

Philadelphia 32, Pennsylvania

On most jobs When Excavating is Necessary

You'll most likely come face to face with one or more Owen buckets, should your travels take you to an excavating job.

The reason why is most simple, for consistent superior bucket performance by Owens is responsible for their widespread use and acceptance.

Bring your equipment catalog files up to date NOW by requesting your copy of the latest Owen Catalog.

The OWEN BUCKET Co.
6070 Breakwater Avenue Cleveland, Ohio
Branches: New York Philadelphia Chicago Berkeley, Cal.

published in 1905 and 1915; and, since they are never mentioned by writers on relativity, evidently are still unknown to them.

In Britannica's article on Spectroscopy (11th ed.), Sir Arthur Schuster, a mathematical and experimental physicist, said: "Nothing impresses the scientific world more strongly than just that little touch of mystery which attaches to a mathematical investigation which can only be understood by the few, and is taken on trust by the many, provided the author is a man who commands general confidence."

But when a theorist concedes that no conception of the mechanism of his theory is possible, when he affirms the existence of an inconceivable "space-time continuum" and denies the existence of force, acceptance of his theory should be withheld until the proof is overwhelming.

Ordinary evidence suffices to give plausibility to an ordinary theory, but extraordinary evidence should be required of an extraordinary theory. Such evidence is lacking for Einstein's theory. Indeed it rests on evidence that would barely give plausibility to a theory whose mechanism resembles that of some well-established theory.

WITH THE MANUFACTURERS & DISTRIBUTORS

New Davey Distributor

J. S. Larkin Co., 5 N. Front St., Harrisburg, Pa., has been appointed distributor for Davey Compressor Co., Kent, O. The Larkin Co. will operate in the following Pennsylvania counties: Dauphin, York, Adams, Cumberland, Perry, Juniata, Snyder, Union, Lycoming, Sullivan, Clinton, Center, Mifflin, Huntingdon, Franklin, Lancaster, Lebanon, Northumberland.

Cataphote Appoints Groce

Cataphote Corporation, Toledo, O., has appointed D. B. Groce as a representative for highway signs and markers, reflector buttons, street signs and posts, danger signals and railroad crossing signs. He will cover counties and distributors in Ohio and Michigan.

Personnel Changes

Harold H. Reed, formerly assistant manager of Air Reduction Sales Co.'s Metropolitan (New York) District, has been appointed manager of this district. He succeeds W. S. Schoenthaler, who is retiring after 37 years of continuous service with the company. Oren M. Donohue, formerly assistant sales manager, has been appointed assistant manager, succeeding Mr. Reed. William B. Brower succeeds Mr. Donohue as assistant sales manager.

New B-G Distributor

Hooper Engineering Co., Skaneateles, N. Y., has been appointed by Barber-Greene Co., Aurora, Ill., as exclusive distributor in Central New York, representing the Barber-Greene Construction and Industrial Divisions.

Opens Division Office

Tournalayer Sales Division of R. G. LeTourneau, Inc., Peoria, Ill., has opened a division office at 5007 East Washington Blvd., Los Angeles, Calif.

Heavy-duty trailers from 5 to 100 tons

SAFE FOR THE BIGGEST LOADS

HAULING CONTRACTORS everywhere depend on Jahn Heavy-Duty Trailers for safe, fast and economical moving of their heaviest loads like this 110,000-lb. transformer. Deep, wide flange main beams run the full length of the trailer. Cross-members and outriggers are I-Beam sections. Improved, fabricated gooseneck adds greater built-in strength. Positive, self-equalized braking at each wheel regardless of position of axle assures maximum safety. See your nearest Jahn dealer for details.

JAHN TRAILERS ALL OVER THE WORLD!
Reg. Trade-Mark

C. R. JAHN COMPANY
1106 WEST 35TH STREET, DEPT. 1145, CHICAGO 9, ILL.

Appointed Sales Engineer

T. A. Dunn

Pioneer Engineering Works, Inc., Minneapolis, Minn., has appointed Truman A. Dunn as sales engineer for the states of Kentucky, West Virginia, Ohio, Indiana, lower Michigan and Northern Illinois. He will headquarter at Bloomfield, Ind., and be contacted through P. O. Box 184, or telephone 246R.

Mr. Dunn has had long experience in the operation, use and maintenance of equipment for aggregates production. During the war he saw service with the Ninth Naval Construction Battalion. Before the war, he was associated with his father for a period of 20 years in the production of crushed stone and ag-lime. Just prior to his recent appointment he was a member of the Pioneer Service Organization.

New Sales Manager for Wood

B. A. Schimmel

B. A. Schimmel has been appointed sales manager of Wood Manufacturing Co., North Hollywood, Calif. He has had over 20 years of selling experience, much of which has been handling construction equipment and machinery. Schimmel replaced DeWitt Page who was sales manager of Wood for many years, and who has left to assume an important position in the east. One of Schimmel's early assignments will be a swing around the country to meet each of the regional distributors of Wood equipment and to analyze the particular requirements of selling mix-in-place road equipment.

New Sales Manager

W. E. Madden has been appointed sales and division manager of the Conveyor division of George Haiss Manufacturing Co., New York, N. Y. Mr. Madden has been associated with the conveyor industry in a sales management capacity for the past 20 years, and was division and sales manager of A. B. Farquahar & Co. from 1931 to 1947.

SLASH COSTS
with Sauerman Machines

Sauerman Cableway moves gravel to plant at high speed.

Tower excavator uses open bottom scraper bucket to handle 600 cu. yd. an hour.

THREE main economies are assured by using Sauerman Scraper or Cableway Machines for long haul work such as moving sand and gravel out of pits or ponds, stripping, stockpiling, bank excavation, etc. These economies are:

(1) Digging, hauling and automatic dumping are merged into a continuous rapid operation controlled by one operator.

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Sauerman machines offer handling capacities from 10 to 600 cu. yd. per hour and operating spans from 200 to 1500 ft. Specifications of the various sizes and types of machines, together with illustrations of their uses are given in the Sauerman catalogs. Write for this literature today.

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Haul SMALL OR MEDIUM EQUIPMENT *with your DUMP TRUCK*

on the ROGERS "TAGALONG" FRONT LOADER

AVAILABLE IN 10 TO 20 TON CAPACITIES

With the new Rogers "Tagalong" trailer a dumptruck serves as the tractor to haul light and medium equipment, and one driver handles both jobs.

Your overhead is kept to a minimum. Hauling charges and costly delays are eliminated with the "Tagalong".

Write for prices and additional information on this versatile trailer which will save its purchase price in a remarkably short time. PATENTS PENDING.

EXPERIENCE builds 'em • PERFORMANCE sells 'em

ROGERS HEAVY DUTY

ROGERS BROTHERS CORPORATION
DESIGNERS and BUILDERS of HEAVY DUTY TRAILERS
SINCE 1915
110 ORCHARD ST. ALBION, PENNA.

Appointed Sales Engineer

C. L. Sarosdy

Blaw - Knox Co., Pittsburgh, Pa., has appointed Cornelius L. Sarosdy as sales engineer for construction equipment in the area covering Texas, Oklahoma and New Mexico. He is assigned to the Birmingham district office and will have his headquarters in Dallas. He received an M.E. degree from Carnegie Institute of Technology, and has been with Blaw-Knox in a designing capacity for the past three years.

Lima and General Machinery Corp. Merge

Lima Locomotive Works, Inc., Lima, O., and General Machinery Corp., Hamilton, O., two of the country's oldest and best known manufacturing concerns in the heavy equipment industry, recently merged forming the Lima-Hamilton Corporation. The action will give the Lima-Hamilton Corporation a diversified line of products including diesel and steam powered locomotives, stationary and marine diesel engines, heavy and medium machine tools, presses for the automotive industry, plate glass polishing machinery, can-making machinery, and the Lima line of power shovels, cranes, draglines, and pull-shovels. Samuel G. Allen and John S. Dixon, former board chairman and president of Lima Locomotive Works, Incorporated, occupy the same positions in the new Lima-Hamilton Corporation. George A. Rentschler, former board chairman of General Machinery Corporation, assumes the position of chairman of the executive committee. In the Lima Shovel and Crane Division Henry Barnhart is vice president in charge. Paul R. Ehrgott is general sales manager and H. H. Buchanan is director of foreign operations.

Increase Manufacturing Facilities

Luke E. Smith, President of the "Quick-Way" Truck Shovel Co., Denver, Colo., has announced that plans are now complete for the construction of a new building, to cost approximately $100,000, to house additional manufacturing facilities at the site of their present plant, which occupies two city blocks. Work was expected to start about Oct. 20, 1947.

Caley Joins Mack

John G. Caley

John G. Caley has been appointed manager of the National Accounts Department for the Southern Division of Mack Trucks, Inc., with headquarters in Atlanta, Ga. He will work with the six factory branches and about 200 Mack dealers in the southern division. Mr. Caley has had many years experience in the trucking business. Recently he was connected with the Caley Trailer and Equipment Co., of Atlanta, Ga., and during the war he was Regional Director for the Office of Defense Transportation in the Southeast. Previously he was vice-president and general manager of Transportation, Inc.

New Davey Distributor

Portable Tool Sales and Service, Inc., 535 North Cicero Ave., Chicago, Ill., has been appointed dealer for Davey Compressor Co., Kent, O., and will handle all equipment of Davey manufacture.

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On new road construction or making those much needed road repairs you can do the job faster, better and cheaper with an Etnyre "Black-Topper"... designed to save you time, labor and material. See your Etnyre dealer or write direct.

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FAST BECOMING A BIG SHOT IN MANY INDUSTRIES!

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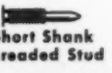
TEMPOTOOL "22" with Safety Shield for light fastening

Standard Studs for Model 22

Long Shank Drive Pin

Short Shank Drive Pin

Long Shank Threaded Stud



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CLEVELAND 15, OHIO

TEMPOTOOL

THE NEW Powder Actuated HAND TOOL

International Harvester Changes

W. K. Perkins, manager of sales, International Harvester motor truck division, has announced the appointment of George S. Menninger as supervisor of motor truck dealer service, replacing C. W. Leslie, who has been appointed retail manager at the newly opened Archer Ave. service station in Chicago. Laird A. Hanson has been appointed supervisor of parts and service merchandizing. He replaces M. D. Dean, appointed manager of Wichita truck branch.

Syntron Opens Branch Office

Syntron Co., Homer City, Pa., has established a branch sales office at 4695 Sherbrooke St., West, Montreal, Que. C. F. A. Gray is in charge. Syntron also has a branch sales office at 2655 Bloor St., Toronto, Ont., with George Draufield in charge.

Opens Branch Office

Dravo-Doyle Company, Pittsburgh, Pa., equipment distributors, has opened a branch office in Cleveland at 3400 Independence Road.

Appointed Vice President

E. E. Isgren

Elmer E. Isgren, a member of the R. G. LeTourneau Inc. organization since 1930, has been appointed vice president in charge of production. He will be responsible for all manufacturing operations at the LeTourneau plants in Peoria, Ill.; Toccoa, Ga.; Vicksburg, Miss., and Longview, Tex., and will headquarter at Peoria, Ill. Mr. Isgren is also a director of the LeTourneau Corporation and, for the past year, has been manager of the Longview, Tex., plant.

Baumgardner Promoted

Robert Baumgardner has been promoted to advertising manager of Pennsylvania Rubber Co. (Jeannette, Pa.), a division of The General Tire & Rubber Co. Prior to this advancement, he was with the advertising department of The General Tire & Rubber Co. in Akron.

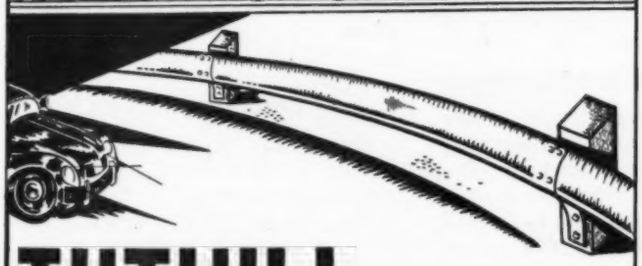
Named Michigan Representative

James S. Emerich, who has been selling petroleum products in Michigan since 1923, has been appointed sales representative for lower Michigan by Pennsylvania Refining Co., Cleveland, O. He will promote the sale of Penn Drake petroleum products in the city of Detroit and the following counties: Wayne, Lapeer, Monroe, Macomb, Ingham, Genesee, St. Clair, Livingston, Jackson, Oakland, Washtenaw, and Shiawassee. His initial sales work will center around the introduction of two new Penn Drake products—Gumout and snow plow wax.

Draper Promoted by Solvay

Neal M. Draper has been appointed manager of St. Louis Branch of Solvay Sales Corporation. Mr. Draper, who has been a salesman in the St. Louis territory for the past 12 years, succeeds M. S. Johnson, who has been transferred to the Boston office. Elmer Seener has been appointed assistant branch manager of the St. Louis Branch.

IN THE SPOTLIGHT



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SAVES LIVES. The springy, convex rail keeps cars from going off the road. At night, too, it shows up clearly under headlights, plainly marking the course of the road.

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"The book gives details of procedure yet is sufficiently general to give an overall picture. It is a book that will not only be used as a text book by engineers, but will also be utilized by the administrators. I think it is one of the best books of its type that I have seen on the subject."
—*Mr. Charles M. Upham, Engineer-Director, American Road Builder's Ass'n, Washington, D. C.*

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THE LA CROSSE IS THE BEST — It combines
all these features into a line of heavy-duty trailers to fit any need:
• Wide Base Rims
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Compare The Cost — Then Look To La Crosse.
Dealers In 48 States
HEAVY DUTY
LA CROSSE
TRAILER CORPORATION
LA CROSSE, WISCONSIN

Appointed Asst. Sales Manager

W. G. Beriswill

W. G. (Bill) Beriswill has been appointed assistant sales manager for Milwaukee Hydraulics Corp., Milwaukee, Wis., manufacturers of the all hydraulic Hydro Crane. He formerly was division sales manager for Osgood Co. and General Excavator Co., Marion, O. He also has been connected with the engineering department of one of the prominent crane-excavator manufacturers and has been a salesman and crane-excavator specialist for a well known distributor of construction machinery.

New Lima Distributor

Thompson Sage, Inc., 400 South Wilson Way, Stockton, Calif., has been appointed agent by the Lima Shovel and Crane Division of Lima-Hamilton Corp., Lima, O., for complete line of Lima shovels, cranes and draglines in the territory surrounding Stockton, Calif.

Visits Latin America

Robert Maynard

Robert Maynard, export sales manager of The Osgood Co., and The General Excavator Co., Marion, O., returned recently from a 3½ months' tour of the principal markets of Central and South America, and the West Indies. He was engaged in making a survey of the market for earth-moving and material handling equipment, the establishment of distributorships, and contacting owners of Osgood and General power shovels and material handling equipment.

Appointed District Manager

Franklin M. (Mac) McCorkel has been appointed a district manager for New Holland Manufacturing Co., Mountville, Pa., with headquarters at 101 N. High St., Columbus, O. He will handle the territory of Ohio, Kentucky, Michigan less the upper peninsula, West Virginia and Tennessee east of the Tennessee River.

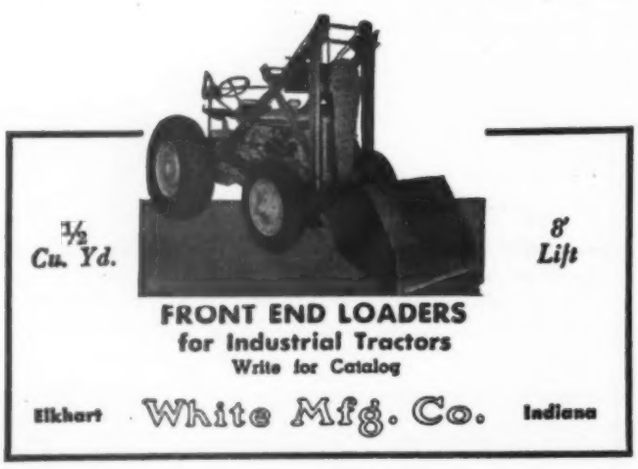
Welch Joins LeTourneau

L. A. Welch

L. A. Welch, prominent Peoria business leader, has been appointed executive vice president of R. G. LeTourneau, Inc., Peoria, Ill. Mr. Welch will augment the present capable direction of other principal LeTourneau officers, Merle Yontz, vice president and treasurer, and Roy McCluskey, vice president and general sales manager, and will assist in coordinating the functions of the division managers at LeTourneau factories in Longview, Tex.; Toccoa, Ga.; and Vicksburg, Miss.

McCool Retires

Harry Y. McCool, Sr., Superintendent of Maintenance of The Timken Roller Bearing Co's. Steel and Tube Division retired Sept. 1, after more than 31 years of service. He is succeeded by Leland S. Steiner, heretofore assistant Superintendent of Maintenance.



Appointed Sales Agent

Frank D. Messenger, formerly vice president K. B. Hubbard Co., and general manager W. G. Chausse, has been appointed direct factory sales agent for Penn Drake snow plow wax by Pennsylvania Refining Co., Cleveland, O. He will operate throughout the lower Michigan Peninsula and will maintain sales headquarters at Fair Haven (P. O. Box 124).

To Make Cabl-Ox Clamps

The new firm Cabl-Ox Corporation, 6 North Michigan Ave., Chicago, Ill., has purchased the entire and exclusive rights to the Cabl-Ox wire rope clamp, Cabl-vise and allied wire rope products, and will manufacture and merchandise them on a much enlarged and accelerated plan.

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CONVEYOR, ELEVATOR and
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all widths and plies
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VISIBLE OIL SUPPLY—The pressure-proof window eliminates guess work. If oil is there, you see it.

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If he cannot supply you, write direct, sending us your dealer's name.

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I-H Exhibits Construction Equipment

A feature of "Harvester's 100 years in Chicago" exhibition last month in Chicago of particular interest to contractors and engineers was the display of diesel crawler tractors and bulldozers, wheel tractors, diesel and gasoline engines, and industrial equipment of various type of construction work.

Bill Parish, assistant sales manager, and Al Mason, a zone manager, of International Harvester Industrial Power Division, on the new TD-24 Tractor

On display were crawler tractors and wheel tractors with bulldozers, scrapers, bucket loaders, sweepers, winches and other equipment. In addition, the exhibit showed diesel and gasoline engines made by International Harvester's Industrial Power Division. Noted for its engines, the company markets these both as complete portable power units and for assembly into more than a hundred different machines built by other manufacturers.

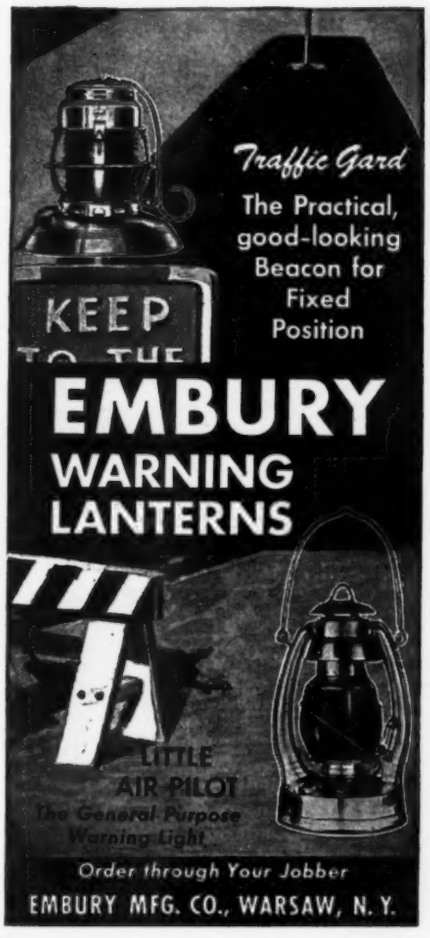
Leading the industrial equipment display was the company's new TD-24 crawler tractor, weighing more than 18 tons and powered by a 170 h.p. diesel engine. This tractor is designed to handle the largest construction equipment of all types and is the largest built by the company.

Appointed Sales Manager

The Colorado Fuel and Iron Corporation has announced the appointment of J. S. Eskin, general manager of sales of Realock Fence Division for the corporation and its subsidiary companies. He will be located at the Curtiss Bldg., 361 Delaware Ave., Buffalo, 2. N. Y.

Smallwood Joins Ryan Co.

Ray H. Smallwood has been appointed sales manager of Geo. T. Ryan, Co., equipment distributors, Minneapolis, Minn. For the past two years he has been advertising and sales promotion manager of American Hoist and Derrick Co., St. Paul, Minn.



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CRUSHING, SCREENING and WASHING UNITS

● Up to 2000 Tons a Day ●

Crushers
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FOR SECONDARY ROAD CONSTRUCTION

The swirling, shopping action of these tines does a thorough job of mixing, wet or dry.

Here's equipment designed especially for mixed-in-place construction — to operate in connection with other general purpose equipment. Wherever aggregates are used it thoroughly pulverizes, mixes and aerates aggregates with binder—rapidly and economically. Also ideal for soil cement stabilization. Safe and easy to operate . . . adjustable to any tractor . . . made 4 standard sizes, 4', 5', 6' and 7'. Write for details.

ARIENS COMPANY
BRILLION, WIS.

Appointed General Sales Manager

H. C. Allington

H. C. Allington, heretofore assistant general sales manager, has been appointed general manager of sales of Wickwire Spencer Steel Division of Colorado Fuel & Iron Corp. Mr. Allington, has been engaged in sales work in the eastern area since the close of World War I when he left the service as an army field clerk. He joined Wickwire Spencer in 1943 to manage a new products department but within a few months he was selected assistant general sales manager which position he filled until the present appointment.

Heads Toncan

H. E. Snyder

Hubert E. Snyder has been appointed managing director of Toncan Culvert Manufacturers Association, succeeding P. H. Pickering, who resigned. Mr. Snyder served in both World War I and the recent war and retired from army service two years ago with the rank of colonel. Since the end of the war he has been associated with the Penn Metal Corporation of Philadelphia. Prior to the recent war he was engaged in culvert manufacturing in Elmira, N. Y. The association has recently moved its offices to Room 209, Midland Bldg., Cleveland, O.

New District Sales Managers

The Murphy Diesel Co., Milwaukee, Wis., has appointed the following as district sales managers: F. R. Meyers for the state of Missouri, Eastern Kansas and Southwestern Illinois; Alexander M. McDougall, 708 Willett St., East Providence, R. I., for the New England states.

Joins Universal Concrete Pipe

Fred W. Morse and Fred W. Plapp, both of Worthington, O., have joined the staff of Universal Concrete Pipe Co., Columbus, O. Mr. Morse is in the production engineering and control department and Mr. Plapp in the product design engineering division.

Shunk Snow Plow and Ice Removal BLADES

Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.

FOR ALL TYPES AND MODELS OF SNOW PLOWS
Various widths, lengths, thicknesses--flat or curved--standard or special--punched ready to fit your machine.

SHUNK SAW-TOOTH ICE BLADE
Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.

Shunk
MANUFACTURING COMPANY
ESTABLISHED 1854
BUCYRUS OHIO

Personnel Changes at Timken

H. C. Edwards, chief engineer of research and development, has been appointed director of research and development succeeding J. F. Leahy, 65, who retired Oct. 1, after 45 years of service with The Timken Roller Bearing Co., Canton, O. Walter F. Green, assistant manager of research and development, became manager of research and development.

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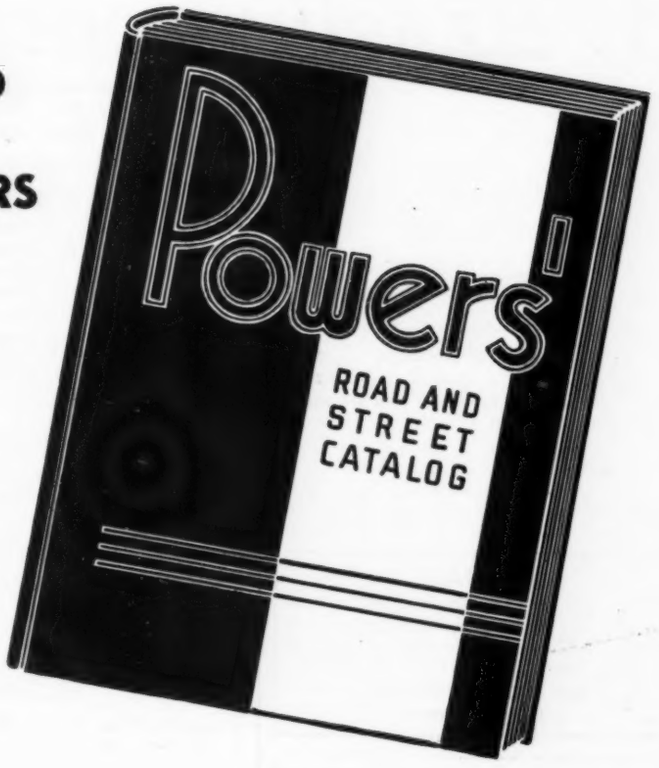

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Comments come pouring in from every part of the field in praise of the Catalog and asking to be kept on the list to receive the next edition.

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ENGINEER WANTED

Experienced Highway Engineer in a Milwaukee County Municipality to take complete charge of highway department and organize an engineering department. Prefer a registered engineer with executive ability and administrative experience. State qualifications fully, age; past experience and salary expected. Strictly confidential. Write

Box 115, Roads & Streets, 22 West Maple St., Chicago 10, Ill.

GENERATOR WANTED

1—Diesel Driven Generator, 220 Volts, D. C. 10 and 20 Kilowatt. Can use high voltage if can use rheostat.

Write to J. A. Laporte
Wilson Boulevard at Barton Street
Arlington, Virginia

FOR SALE

TD-14 equipped with Hughes-Keen–an MC-1R crane and 16' boom. Like new. Will sell crane and winch or trade above machine for new TD-14.

GRAYDON ANDERSON
Greene, Iowa

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2 only—32 x 27 HAMMERMILLS.

1 only—40 x 36 HAMMERMILLS.

New units of sturdy quality, standard make, immediate delivery. Prices on application.

1 only—10 x 20 R. B. JAW CRUSHER.

1 only 10 x 40 R. B. JAW CRUSHER.

Above are new. Immediate delivery, at exceptionally low prices. Several more available two weeks delivery—prices on application.

1 only—18" x 20' long. Portable all-steel FLIGHT CONVEYOR—mounted on steel wheels. Price, without power (f.o.b. Mpls.) $500. All subject to prior sale.

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New or Rebuilt

Sale or Rent

Headquarters for REPAIRS—any make. Factory service. We will also *buy* your old instruments or take them in *trade*.

A complete line of engineering Instruments and Equipment for Field or Office. Write for Bulletin RS-1111.

WARREN-KNIGHT CO.

Manufacturers of Sterling Transits and Levels
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1—Barber-Green 842 Hot Asphalt plant.
1—Barber-Green Finishing Machine.
1—Lima Diesel Paymaster Crane.

METROPOLITAN PAVING COMPANY
1600 W. Reno, Oklahoma City, Okla.

FOR SALE

1—Marion, Model 372, 3-yard Shovel, Crane and Dragline with Cat. D-13000 motor.
1—Lima, Model 901 Dragline, 2½-yard.
1—Koehring, Model 803 Crane, w/ Caterpillar D-17000 motor.
1—Koehring, Model 604, Dragline, 1½-yard.
1—Koehring, Model 304, Dragline, ¾-yard.
1—Byers, Model 55 Crane.
1—Byers, Model 65 Truck Crane. Shovel Fronts for Northwest Model 25, Model 6 and Model 80-D.
3—Caterpillar D-8 Tractors, 1H Series.
2—LaPlant-Choate Carryall Scrapers, 22-yard.
4—LeTourneau Model LS Scrapers.
1—LeTourneau Model X Scraper.
1—Galion Motor Grader.
1—Adams Pull Grader.
3—Buckeye Chip Spreaders, 8 ft.
2—Sterling Dump Trucks, 12-yard, Rock bodies, diesel power.
2—Huber Rollers.
1—Rex Pumpcrete.
8—Buda Model 844 Engines.
Kohler Light Plants.
For further information and price apply to

BOWEN & McLAUGHLIN
733 No. 19th Ave., Phoenix, Ariz.
Telephone 3-6173

FOR SALE

New WAUKESHA 6-MZAU Power UNITS, 4¼x4¼, 404 cubic inches displacement, complete with house, air cleaner, ring ear, Delco Remy starter, radiator screen, coil and vacuum gauge—less clutch (but clutch could be furnished). 88 Brake H.P. rating at 1,800 R.P.M. These are new units on which we are overstocked. Write for prices.

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With mechanical engineering background in the petroleum, road building and highway machinery and equipment industries. Have broad knowledge of sales methods and have worked with top management as saleman, sales manager and sales promotion director. Available now. Resume and references supplied on request.

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SUCTION HOSE

USES: Portable Pipe Lines; Handling Water, Liquids, etc.; Sewer & Trench Work; Manholes; Suction or Discharge on Pumps; Mines; General Heavy Duty suction work, etc.

DESCRIPTION: New Heavy-Duty 4-inch inside diameter steel-reinforced Suction (or Discharge) Hose complete with male and female fittings. Abrasion-resistant rubber; heavy steel wire reinforcing; plies of heavy fabric. All in 10-ft. lengths complete with fittings. Smooth bore. Couplings are built-in, full-flow, with fixed lug nuts on one end and hand lug swivel nuts on other end; recessed to hold washer in place when hose is disconnected; Eliminates necessity of using wrench.

SALE PRICE is less than ONE-FOURTH the regular NEW PRICE

PRICE per 10-ft. length complete with male and female fittings, brand new. **$12.00**

BERNSTEIN BROTHERS
SINCE 1870

Pueblo, Colorado **Phone 8404**

FOR SALE

3—Osgoods—Model 200—½ Yard Capacity Combination Backhoes, Draglines and Cranes—year 1946.
1—TD-14 Tractor with Angledozer—200 hours.
1—Cletrac Bulldozer, BG, with Garwood Angledozer, new engine, new sprockets.
1—Sargent Overhead Loader on Cletrac Tractor, ½ Yard Bucket—new condition.
1—Barber-Greene Trencher, 5½ foot. Rebuilt.
1—McKiernan-Terry Air Hammer No. 2—New.
1—Model 112 Caterpillar Diesel Motor Patrol.
1—Fairbanks-Morse Diesel Engine—6 Cylinder, 240 H. P. at 500 R. P. M. Model 35E10M, with spare parts.
1—6" Moretrench Pump complete with Pipes and Wellpoints.
1—125 Volt DC Fairbanks-Morse 2 Cylinder 16 H. P. 800 R. P. M.
2—⅜ Yard Clamshell Buckets, Owens—Type M.
1—1½ Yard Dragline Bucket, without chains—Low priced.
2—⅜ Yard Dragline Buckets—used.
Tunnel Equipment—Rails, Switches, Skips, Grouting Machine, Air Vibrator, Concrete Buckets, Air Tools, Steel Forms.
6—Dump Trucks—4 Wheelers.
1—#38 Mueller Tilting Mixer, Gasoline Driven, Air Cooled Engine—New.

Write to J. A. Laporte
Wilson Blvd. at Barton St.
Arlington, Va.

American Road Builders' Association

announces

TWO IMPORTANT MEETINGS IN 1948

HIGHWAY CONFERENCE

JANUARY 26-28

Mayflower, Statler and Willard Hotels

WASHINGTON, D. C.

An interesting 3-day program! Famous speakers, conferences, forums, reports of technical committees, business sessions, induction of new officers. The capital at the height of the season!

Make your hotel reservations AT ONCE! Congress will be in session at the time. Write, wire or phone for official application blanks today.

1948 ROAD SHOW

SOLDIER FIELD

and

45th Annual ARBA Convention

JULY 16-24

CHICAGO

The 1948 ROAD SHOW will be the largest exposition of equipment, machinery and materials used in the construction of highways and airports ever staged . . . for the first time, heavy machinery exhibited *AND OPERATED* out of doors in an area of over 1,200,000 square feet. 100,000 people will see it.

For information address

AMERICAN ROAD BUILDERS' ASSOCIATION

International Building

Washington 4, D. C.

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Check reference to advertisement or to items of equipment or materials on which you wish to receive information. Give your name and address in the space at foot of page (if convenient, please print or use typewriter), detach page and mail to ROADS AND STREETS, Readers' Service Department, 22 West Maple Street, Chicago 10, Ill. We will pass your inquiry along to manufacturers and see that you get desired information promptly.

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Check other products below on which you wish us to obtain information for you:

AGGREGATE:
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- ☐ Conveyors
- ☐ Crushers
- ☐ Portable Plants
- ☐ Screens

BITUMINOUS:
- ☐ Batchers
- ☐ Finishers
- ☐ Distributors
- ☐ Dryers
- ☐ Heaters
- ☐ Plants (central)
- ☐ Plants (travel)

CONCRETE:
- ☐ Batchers
- ☐ Buggies and Carts
- ☐ Finishers
- ☐ Joints, Expansion and Contraction
- ☐ Reinforcement Accessories
- ☐ Metal Road Accessories
- ☐ Mixers (under 1 yd.)
- ☐ Mixers (1 yd. up)
- ☐ Pavers
- ☐ Reinforcing Steel
- ☐ Road Forms (1000' set)
- ☐ Tower
- ☐ Truck Mixers

CRANES:
- ☐ Crawler Mounted
- ☐ Truck Mounted
- ☐ Piledrivers

GRADERS:
- ☐ Blade, self propelled
- ☐ Blade, pull type
- ☐ Blade, under truck
- ☐ Elevating

LOADERS & TRENCHERS:
- ☐ Front-end loader (tractor mounted)
- ☐ Loader, bucket type and belt type
- ☐ Trencher or Ditcher

HAULING EQUIPMENT:
- ☐ Dump Trucks, self-powered
- ☐ Dump Wagons, tractor drawn
- ☐ Flatbed Trailers
- ☐ Other Trucks

PUMPS:
- ☐ Centrifugal
- ☐ Concrete
- ☐ Diaphragm
- ☐ Mud Jacking
- ☐ Piston
- ☐ Wellpoint

POWER UNIT: (Independent)
- ☐ Gasoline
- ☐ Diesel
- ☐ Electric

ROLLERS:
- ☐ Power (Smooth)
- ☐ Pneumatic Tire
- ☐ Sheepsfoot

TRACTORS:
- ☐ Crawler
- ☐ Rubber-Tired

TRACTOR EQUIPMENT:
- ☐ Dozers
- ☐ Power Control Units
- ☐ Rippers
- ☐ Scrapers, tractor drawn
- ☐ Scrapers, self-powered

BUCKETS:
- ☐ Clamshell
- ☐ Concrete
- ☐ Dragline
- ☐ Orange Peel

SHOVELS & DRAGLINES:
- ☐ Crawler (under 1 yd.)
- ☐ Crawler (1 yd. up)
- ☐ Truck Mounted

ROCK DRILLS & AIR TOOLS:
- ☐ Air Compressors
- ☐ Backfill Tampers
- ☐ Clay Diggers
- ☐ Concrete Vibrators
- ☐ Drills, cabel tool
- ☐ Drills, tripod and wagon
- ☐ Drills, rock, hand-held
- ☐ Paint Sprayers
- ☐ Paving Breakers
- ☐ Riveters and Chippers

MISCELLANEOUS:
- ☐ Buildings, portable
- ☐ Earth Drills, power
- ☐ Light Plants
- ☐ Lubrication, Service Truck
- ☐ Mowers, Highway
- ☐ Power Saws
- ☐ Soil Stabilizing Equipment
- ☐ Snowplows, rotary
- ☐ Snowplows, v or wing
- ☐ Spreaders, sand or cinders
- ☐ Street Flushers
- ☐ Street Sweepers
- ☐ Welders
- ☐ Cutting Torches
- ☐ Hydraulic Jacks
- ☐ Hydraulic Control Equipment
- ☐ Hand Tools
- ☐ Hoists, derrick type

Be sure to fill in name and address below:

Your Name.....Title or profession.....

Name of your company or governmental department.....

Type of work for which equipment will be used.....

Street Address.....

City ..... State ..... County .....

TRU-LAY Preformed

for SHOVEL ROPES

• More often than not, power shovels give wire ropes a terrific beating. Heavy rocks, coarse gravel, debris of all sorts make the lines quiver with strain. Yet it is on just such service that TRU-LAY Preformed proves its ability to take punishment. Specify it for every shovel service, whether hoist lines, boom lines, thrust, racking and crowding lines, or trip cables.

The ideal wire rope for these applications is TRU-LAY Preformed Improved Plow Steel. In that rope you get the proper combination of strength and toughness, plus fatigue-resistance and smooth spooling that gives better, longer service. Of course, TRU-LAY Preformed comes in all constructions, sizes, lays and centers.

Then, too, you can get prompt help of an experienced American Cable engineer. Every salesman of American Cable wire ropes has the exact specification (construction and grade) for *every* wire rope application. He can save you time and money. Wire or write today.

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Seattle, Bridgeport, Conn.

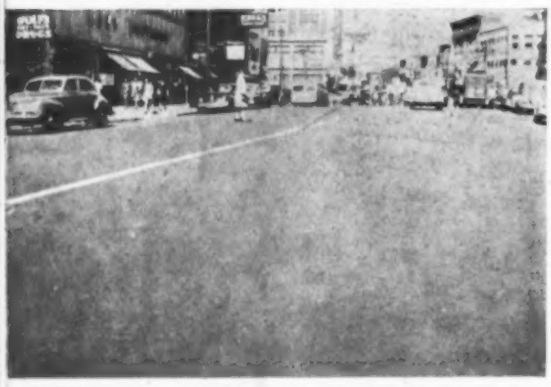
AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

"As easy as icing a cake . . ."

Newspaper reporter's description of speed and precision with which new Texaco Asphalt paving was laid over old Elizabeth, N. J., streets

Laying a new Texaco Asphaltic Concrete wearing surface on one of a number of old, rough streets in Elizabeth, N. J.

BEFORE: The old pavement on Broad Street, Elizabeth, was rough on motorists and unsightly.



AFTER: The new Texaco Asphaltic Concrete surface is smooth, resilient, rugged—a welcome improvement to motorists.

This year, the city of Elizabeth, N. J., tackled its biggest street improvement program in many years. Fourteen worn, rough sections of important arterial streets were scheduled for resurfacing, including Broad Street, the city's busiest thoroughfare.

Elizabeth chose a fine-graded Asphaltic Concrete pavement for its streets. Dense, rugged and resilient, this plant-mix type of asphalt construction will stand up under years of hard wear with a minimum of maintenance.

Depending upon the condition of the old street, from one to three courses of Asphaltic Concrete were employed. Texaco Asphalt Cement, with a penetration between 60 and 70, has been used almost exclusively by the contractors, the Standard Bitulithic Company and the American Paving Corporation, both of Newark, N. J.

Elizabeth is one of 1,500 representative U. S. cities which have paved with resilient, lasting Texaco Asphalt during the past 40 years.

Discuss your street paving or maintenance problem with a Texaco representative, who is an Asphalt specialist. His knowledge and experience are at your service, without placing you under any obligation. Write our nearest office.

THE TEXAS COMPANY, Asphalt Sales Dept., 135 E. 42nd Street, New York City 17

Boston 16 Chicago 4 Denver 1 Houston 1 Jacksonville 2 Philadelphia 2 Richmond 19

TEXACO

REG. T. M.

TEXACO ASPHAL